Behavioral Medicine
ASSESSMENT AND TREATMENT STRATEGIES

Behavioral Medicine
ASSESSMENT AND TREATMENT STRATEGIES

Edited by
Daniel M. Doleys
Behavioral Medicine Services
Brookwood Medical Center
Birmingham, Alabama

R. L. Meredith
Vaughan Clinic
Brookwood Medical Center
Birmingham, Alabama

and

Anthony R. Ciminero
Veterans Administration Medical Center
Behavioral Medicine Institute
Miami, Florida

Plenum Press • New York and London

First Printing — March 1982
Second Printing — February 1985

Contributors

Jeanne Achterberg-Lawlis, Ph. D., *Department of Rehabilitation Science, University of Texas Health Science Center, Dallas, Texas*

A. Barney Alexander, Ph. D., *Clinical Psychologist, 8790 West Colfax, Lakewood, Colorado*

John Palmer Anderson, Ph. D., *Division of Special Studies, University of Alabama, Birmingham, Alabama*

Frank Andrasik, Ph. D., *Department of Psychology, State University of New York, Albany, New York*

D. A. Begelman, Ph. D., *Clinical Psychologist, Three Corners, West Meetinghouse Road, New Milford, Connecticut*

Alan S. Bellack, Ph. D., *Department of Psychology, University of Pittsburgh, Pittsburgh, Pennsylvania*

Irving Bieman, Ph. D., *Farr Associates, Greenboro, North Carolina*

Anthony R. Ciminero, Ph. D., *Psychology Service, Veterans Administration Hospital, Miami, Florida*

Dave Coleman, Ph. D., *University of Maryland, Munich Campus, APO New York*

Robert S. Davidson, Ph. D., Director, *Behavioral Medicine and Automated Assessment Laboratories, Veterans Administration Medical Center, and Department of Psychology, Florida International University, Miami, Florida*

Jerry L. Deffenbacher, Ph. D., *Department of Psychology, Colorado State University, Fort Collins, Colorado*

Daniel M. Doleys, Ph. D., *Program Director, Behavioral Programs, Brookwood Medical Center, Birmingham, Alabama*

Michael E. Dunn, Ph. D., *Psychology Service, Veterans Administration Medical Center, Palo Alto, California*

Leonard H. Epstein, Ph. D., *Department of Psychiatry, University of Pittsburgh School of Medicine, Western Psychiatric Institute and Clinic, 3811 O'Hara Street, Pittsburgh, Pennsylvania*

Michael Feuerstein, Ph. D., *Department of Psychology, McGill University, Montreal, Quebec, Canada*

J. Gainer, *Department of Psychology, McGill University, and Behaviour Therapy Institute, Montreal, Quebec, Canada*

Steven H. Herman, Ph. D., *Psychology Service, Veterans Administration Medical Center, and Behavioral Medicine Institute, Miami, Florida*

Pam Hyde, *Neurosciences Program, University of Alabama School of Medicine, Birmingham, Alabama*

Martin Y. Iguchi, Ph. D., *Department of Psychology, Boston University, Boston, Massachusetts*

Cornelia Kenner, Ph. D., *Department of Surgery, University of Texas Health Science Center, Dallas, Texas*

Dean G. Kilpatrick, Ph. D., *Department of Psychiatry and Behavioral Sciences, Medical University of South Carolina, Charleston, South Carolina*

D. Alan Lankford, Ph. D., *Department of Psychiatry and Behavioral Sciences, University of Texas Medical Branch, Galveston, Texas*

Bruce James Masek, Ph. D., *Department of Psychiatry, Harvard Medical School, Boston, Massachusetts*

Ronald L. Meredith, Psy. D., *Vaughan Clinic, Brookwood Medical Center, Birmingham, Alabama*

Susan J. Middaugh, Ph. D., *Department of Physical Medicine and Reha-*
bilitation, Medical University of South Carolina, Charleston, South
Carolina

Jesse B. Milby, Ph. D., *Chief of Psychology Service, Birmingham Veter-*
ans Administration Medical Center, Departments of Psychiatry and
Psychology, University of Alabama, Birmingham, Alabama

Randall L. Morrison, Ph. D., *Department of Psychology, University of*
Pittsburgh, Pittsburgh, Pennsylvania

David I. Mostofsky, Ph. D., *Department of Psychology, Boston Univer-*
sity, Boston, Massachusetts

I. Keith Orton, Ph. D., *Good Samaritan Hospital and Medical Center,*
Portland, Oregon

Vernon Pegram, Ph. D., *Department of Psychiatry, University of*
Alabama School of Medicine, Birmingham, Alabama

Nancy Rainwater, Ph. D., *Staff Psychologist, Barbara Davis Center for*
Childhood Diabetes, Denver, Colorado

Patricia A. Resick, Ph. D., *Department of Psychology, University of Mis-*
souri, St. Louis, Missouri

Richard M. Suinn, Ph. D., *Chairman, Department of Psychology,*
Colorado State University, Fort Collins, Colorado

Jerry J. Sweet, Ph. D., *Department of Psychiatry, Illinois Masonic Medi-*
cal Center, Chicago, Illinois

C. Barr Taylor, M. D., *Department of Psychiatry, Stanford University,*
Stanford, California

Dennis C. Turk, Ph. D., *Department of Psychology, Yale University,*
New Haven, Connecticut

Samuel M. Turner, Ph. D., *Department of Psychiatry, Western Psychiat-*
ric Institute and Clinic, University of Pittsburgh School of Medicine,
Pittsburgh, Pennsylvania

Lois J. Veronen, Ph. D., *Department of Psychology and Behavioral Sci-*
ences, Medical University of South Carolina, Charleston, South
Carolina

C. Eugene Walker, Ph. D., *Department of Psychiatry and Behavioral Sciences, University of Oklahoma Medical School, Oklahoma City, Oklahoma*

Donald A. Williamson, Ph. D., *Department of Psychology, Louisiana State University, Baton Rouge, Louisiana*

Steven Zlutnick, Ph. D., *Department of Educational Psychology/Counseling, University of San Francisco, and Pacific Medical Center, San Francisco, California*

Contents

Introduction and Overview

The introduction to any book of this type is the shortest section but also one of the more difficult tasks to accomplish well. The introduction should provide some underlying thread, rationale, or conceptual model that will allow the reader to put the remaining material into proper perspective. The present task is made even more difficult than usual by the relative newness of the term *behavioral medicine* and the rapid growth that has characterized the field in the last several years. Relatively little has been written about what behavioral medicine actually is, though many researchers and practitioners attach this or some similar label to their clinical and research activities. In spite of the apparent lack of clarity and agreement, recent years have seen such enormous growth in this area that today a separate Society of Behavioral Medicine exists. Three publications, *Journal of Behavioral Medicine, Behavioral Medicine, Behavioral Medicine Abstracts*, and the society's newsletter, *Behavioral Medicine Update*, are available, not to mention a growing number of books (Ferguson & Taylor, 1980; McNamara, 1979; Melamed & Siegal, 1980; Pomerleau & Brady, 1979; Williams & Gentry, 1977). In 1978, the American Psychological Association announced the addition of the division of Health Psychology as its newest and 38th division. Internships, postdoctoral training, and doctoral programs in behavioral medicine, health psychology, and medical psychology have appeared throughout the country. Funding from governmental agencies has also been channeled into this area (Matarazzo, 1980).

This general area seems, at least in part, to have grown out of discussions over the inadequacy of the "medical model" to account for and generate effective treatment strategies for problems of health. Two somewhat separate yet related trends appear to have merged. First, the emphasis on expanding, modifying, and/or revamping the traditional medical model of disease. Engle (1977) described a biopsychosocial model in which the professional's task was to weigh the "relative contributions of social and psychological as well as biological factors in the patient's

dysphoria and dysfunction as well as in his decision to accept or not accept patienthood and with it the responsibility to cooperate in his own health care" (p. 133). Second, advancements in behavioral technology and behavioral therapy were expanding the therapeutic horizons beyond those of "neurotic" and maladaptive behavior disorders to address health-related issues. Pomerleau, Bass, and Crown (1975) and Pomerleau (1979), for example, outlined the potential role of behavioral psychology in the management, prevention, and alleviation of "medical problems." Other articles also began to appear noting the efficacy of psychological services in reducing utilization of the health care system (Rosen & Wiens, 1979). These trends seemed destined to merge, and they did. However, the merger created some difficulty, highlighted by the use of a variety of labels including *medical psychology* (Prokop & Bradley, 1981) and *behavioral medicine* (Pomerleau *et al.*, 1975; Schwartz & Weiss, 1977). This "new" approach was also seen as a renewed interest in an existing area, *psychosomatic medicine* (Lipowski, 1977). The terms *health psychology* and *behavioral health* were also being used with increasing regularity (Matarazzo, 1980). The multiplicity of terms and definitions seems to have added confusion rather than solidarity. But, perhaps such growing pains are necessary as traditional conceptual models are revised and new directions formulated.

DEFINITIONS

It might be useful to review some of the existing definitions of behavioral medicine and related terms. The term *behavioral medicine* has been defined in various ways. Schwartz and Weiss (1977) commented that

> behavioral medicine is the field concerned with the development of behavioral science knowledge and techniques relevant to the understanding of physical health and illness, and the application of this knowledge and the techniques to diagnosis, prevention, treatment and rehabilitation. Psychoses, neuroses and substance abuse are included only insofar as they contribute to physical disorders as an end point. (p. 379)

This proposed definition was later expanded (Schwartz & Weiss, 1978). Pomerleau and Brady (1979) argued that the above definition was too broad. Recognizing the potential problem of being too narrow they suggested a compromise:

> Behavioral medicine can be defined as (a) the clinical use of techniques derived from the experimental analysis of behavior—behavior therapy and behavior modification—for the evaluation, prevention and treatment of physical disease or physiological dysfunction; and (b) the conduct of research contributing to the functional analysis and understanding of behavior associated with medical disorders and problems of health care. (p. xii)

This definition focused on the application of the experimental analysis of behavior to health problems rather than to call for the incorporation of

more diverse behavioral-science knowledge and methodology. Blanchard (1977) was perhaps even more specific when he noted that

> by behavioral medicine I mean the systematic application of the principles and technology of behavioral psychology to the field of medicine, health and illness. By behavioral psychology I mean primarily experimental, or at least empirical psychology which has its roots in psychology of learning, social psychology and to a lesser degree, physiological psychology. (p. 2)

Ferguson and Taylor (1980) take a similar view as they emphasize the application of behavioral techniques to medical problems as the defining characteristic of behavioral medicine.

Benson (1979) seems to be in line with the definition proposed by Schwartz and Weiss by defining behavioral medicine as "an interdisciplinary approach to health care which incorporates principles of medicine, physiology, psychiatry and psychology" (p. 16). He emphasizes the integrative and synthesizing functions of behavioral medicine and places it in the same arena as holistic medicine.

According to Matarazzo, *behavioral-health* has become

> an interdisciplinary field dedicated to promoting a philosophy of health that stresses individual responsibility and the application of behavioral and biomedical science, knowledge and techniques to the maintenance of health and the prevention of illness and dysfunction by a variety of self-initiated individuals or shared activities. (1980, p. 813)

He refers to *health psychology* as

> the aggregate of the specific educational, scientific and professional contribution of the discipline of psychology to the promotion and maintenance of health, the prevention and treatment of illness and the identification of etiology and diagnostic correlates of health, illness and related dysfunction. (p. 815)

In summary, there appear to be two general views of behavioral medicine. One is a broad view focusing on the development and integration of knowledge and technology from the behavioral sciences. The other emphasizes the application of behavioral analysis and technology to problems of health and disease. Webster's dictionary (1969) says the word *definition* means "word or phrase expressing the essential nature of a person or thing" (p. 216). Perhaps what exists today are a variety of descriptions rather than definitions of behavioral medicine, as it would seem clear that the "essential nature" of this area remains elusive. Most likely the ultimate definition of behavioral medicine will grow out of the activities of the individuals who identify themselves as practicing in this area. To date, unfortunately, this could include almost anyone who chooses to participate because of the variety and scope of existing definitions. As time passes, the meaning of behavioral medicine will probably be shaped by the natural contingencies of funding policies, journal editing, society membership, and academic employment criteria. The relationship between behavioral medicine and the other terms noted above also remains uncertain. It is our view that the term *behavioral*

medicine should be considered in the more restrictive sense, as suggested by Pomerleau and Brady (1979), and the more generic term *medical psychology* be used to refer to those activities that are broader in scope.

GOALS AND METHODS

An examination of these descriptions, of the papers being presented at regional and national conventions, and of the published articles reveals the difficulty in defining the parameters of behavioral medicine. Indeed, we do not propose, nor do we desire to propose, yet another definition. An alternative and perhaps more instructive way of approaching this task might be to examine and speculate on the goals and methodology of behavioral medicine. Within this context some attention must also be given to the behavioral medicine practitioner/researcher. Specifically, what might constitute adequate training or background?

Behavioral medicine differs from the general area of clinical psychology in the problems it addresses. The word *behavioral* itself implies that the focus of attention is on problems of disturbed, disordered, maladaptive or dysfunctional behaviors that have some associated physiological (medical) component. Behavioral disturbance or dysfunction may be a precipitating factor in eliciting or promoting the underlying pathology (e.g., ulcers, headaches, etc.), maintaining the illness (e.g., noncompliance to treatment regimens), or may be a function of the physiological condition (e.g., chronic pain). These categories obviously are not mutually exclusive. If this is the case, then it would follow that an adequate assessment of the behavioral-psychological factors involved would be enhanced by some understanding of the physiology of the organism and the nature of the physical pathology. Furthermore, the development and effective implementation of intervention procedures would seem to be related to such a knowledge base. If we accept these premises, then it would appear that behavioral medicine practitioners and researchers would be well served to have a working knowledge and understanding, if not adequate training (specialized seminars and clinical training), in areas of anatomy, physiology, pharmacology, neurosciences, and learning-conditioning. This background would maximize effectiveness and also enhance the ability to communicate with medically trained colleagues.

Others have commented on the goals and methodology of behavioral medicine, which are certainly implied, if not clearly indicated, in the descriptions reviewed above. Our views seem to parallel those presented by Blanchard (1977) and Pomerleau and Brady (1979). First, behavioral medicine should be empirically based on and couched in sound experimental methodology, using appropriate single-subject and group experimental design. Maintaining rigor in defining and measuring both independent and dependent variables and in the execution of intervention strategies is paramount. Second, behavioral medicine should focus on

prevention and reduction of disease and disease-related behaviors. An important activity is describing the functional relationships between behavior, environment, "disease," and health. The application of principles of the experimental analysis of behavior will be invaluable in accomplishing this task. Third, behavioral medicine should strive to develop effective assessment and intervention strategies for disease and physiological dysfunction and for the various behavioral and emotional consequences of diseases. Such strategies may be oriented toward some presumed underlying physiological mechanism, such as EEG patterns in the seizure-disordered patient and vascular blood flow in headache patients, or more indirectly via modification of broader response patterns, such as medication compliance in the hypertensive patient and diet adherence in the obese or diabetic patient. Finally, behavioral medicine should strive to integrate the expertise of colleagues in other behavioral sciences, thus making our efforts multidisciplinary in nature to prevent a myopic approach to problems of health. This does not imply that every project that is conducted under the guise of behavioral medicine need involve a multitude of disciplines. It does, however, recognize that cooperation among professionals of various disciplines may facilitate the development and execution of intervention strategies likely to have significant impact on the total health picture.

ORGANIZATION OF CHAPTERS

It takes little scrutiny to realize the great variability among the chapters in this book. The book is not intended to be a "handbook" in behavioral medicine nor a "textbook" of behavioral medicine. Rather, it is an attempt to describe some of what appear to be the more commonly used procedures for assessment and intervention and to illustrate the scope of the disorders to which these procedures have been applied. The range of topics is not exhaustive but should be considered as representative. The chapters vary considerably in terms of the extent to which authors have chosen to elaborate a particular disorder, the existing data, and the intervention procedures. In some cases little data are available. The methods by which the various contributors have presented their topics may further reflect a variety of interpretations on how specific issues in behavioral medicine should be approached. It should also be recognized that in any venture of this type the data are somewhat outdated by the time the book is published. The *approaches* to generating assessment and treatment strategies, however, maintain their practical and heuristic value.

The chapters are divided into three sections, General Assessment and Intervention Procedures, Therapeutic Approaches to Specific Disorders, and Therapeutic Approaches to Special Populations. The first section was designed to review general operant and behavioral methods and

discuss how such procedures have been or could be applied to problems of disease, rehabilitation, and health. Although an understanding of the various procedures is not sufficient, it is necessary. A good working knowledge of the therapies available can be invaluable in the development and refinement of efficient and effective assessment and treatment strategies. By providing a relatively broad overview, we hope to stimulate even more creative but empirically sound approaches in behavioral medicine. As once noted, "if the only tool one possesses is a hammer, then everything around you can look like a nail."

The second section of the book attempts to exemplify the application of various behavioral procedures to a variety of specific disorders. In some cases a specific procedure, such as biofeedback, was the mainstay of treatment, while in others a "package" consisting of a number of techniques was found to be most useful. These chapters are not intended to be exhaustive nor represent the state of the art. Rather, they illustrate how a functional analysis of these disorders can lead to the systematic development of effective treatment strategies. The treatment outcome data are not always complete or clinically impressive. But the technology is still developing. In many cases the data argue for a better understanding of the nature of these disorders and how they might be susceptible to modification via behavioral technology and therapies. Advancement in such technology is inevitable when sound experimental procedures are employed.

The second section also covers a number of common medically oriented problems, such as hypertension, headaches, seizure disorders, movement disorders, and pain. It also includes problems not typically reviewed in other books of this type, such as urological disorders and problems with sleep. One might wonder about the inclusion of sexual dysfunctions. Our basic understanding of the methodology for the management of sexual dysfunction can be invaluable in screening candidates for penile prosthesis, thus assuring that surgery is not undertaken except in cases when it appears to be warranted. Additionally, this information can be useful in developing programs of rehabilitation for spinal-cord-injury patients.

The third section of the book focuses on intervention strategies with various populations. The differentiation of "populations" from "disorders" is somewhat arbitrary and might better be viewed from the standpoint of patient management versus treatment of a problem. There are difficulties encountered in treating various types of patients regardless of the specific problem involved. For example, many geriatric patients are disoriented or depressed and experience neurological dysfunction. Procedures that are ordinarily effective (i.e., urine alarm for enuresis) may have to be modified to take these other factors into account. Therapeutic goals may also have to be adjusted.

Some of the material in this section has received considerable attention, for example, treatment of the anxious and the noncompliant patient.

However, only in recent years has behavioral psychology made a concerted effort to examine the problems of the geriatric patient. Similarly, relatively little has been written about management of the burn victim. The chapter dealing with the mistreating parent was included in an attempt to foster greater understanding of factors that lead parents to engage in abusive behavior. Children who experience chronic medical problems, such as asthma or any of a number of developmental disabilities, are often targets of abusive treatment. Some parents will misapply techniques taught to them by well-intentioned professionals. Children who are products of such environments may develop a number of psychophysiological problems.

<div align="right">

DANIEL M. DOLEYS
R. L. MEREDITH
A. R. CIMINERO

</div>

REFERENCES

Benson, H. *The mind/body effect.* New York: Simon & Schuster, 1979.

Blanchard, E. B. Behavioral medicine: A perspective. In R. B. Williams & W. D. Gentry (Eds.), *Behavioral approaches to medical treatment.* Cambridge, Mass.: Ballinger, 1977.

Engel, G. L. The need for a new medical model: A challenge for biomedicine. *Science,* 1977, *196,* 129–136.

Ferguson, J. M., & Taylor, C. B. (Eds.). *The comprehensive handbook of behavioral medicine.* New York: Spectrum Publication, 1980.

Lipowski, Z. J. Psychosomatic medicine in the seventies: An overview. *The American Journal of Psychiatry,* 1977, *134,* 233–243.

Matarazzo, J. D. Behavioral health and behavioral medicine: frontiers for a new health psychology. *American Psychologist,* 1980, *35,* 807–817.

McNamara, J. R. (Ed.). *Behavioral approaches to medicine: Application and analysis.* New York: Plenum, 1979.

Melamed, B. G., & Siegel, L. J. (Eds.). *Behavioral medicine: Practical applications in health care.* New York: Springer, 1980.

Pomerleau, O. F. Behavioral medicine: The contribution of the experimental analysis of behavior to medical care. *American Psychologist,* 1979, *34,* 654–663.

Pomerleau, O. F., Bass, F., & Crown, V. Role of behavior modification in preventive medicine. *The New England Journal of Medicine,* 1975, *292,* 1277–1282.

Pomerleau, O. F., & Brady, J. P. (Eds.). *Behavioral medicine: theory and practice.* Baltimore: Williams & Wilkins, 1979.

Prokop, C. K., & Bradley, L. A. (Eds.). *Medical psychology: Contributions to behavioral medicine.* New York: Academic Press, 1981.

Rosen, J. C., & Wiens, A. N. Changes in medical problems and use of medical services following psychological intervention. *American Psychologist,* 1969, *24,* 565–584.

Schwartz, G. E., & Weiss, S. M. Yale conference on behavioral medicine: A proposed definition and statement of goals. *Journal of behavioral medicine,* 1978, *1,* 3–12.

Schwartz, G. E., & Weiss, S. M. Behavioral medicine revisited: An amended definition. *Journal of Behavioral Medicine,* 1978, *1,* 249–251.

Webster's seventh new collegiate dictionary. Springfield, Mass.: G. & C. Merriam, 1969.

Williams, R. B., & W. D. Gentry (Eds.). *Behavioral approaches to medical treatment.* Cambridge, Mass.: Ballinger, 1977.

Professional and Legal Issues in Behavioral Medicine

D. A. BEGELMAN

INTRODUCTION

As in other areas of inquiry marked by new frontiers of research and the emergence of fresh professional roles, behavioral medicine is bound to be an arena of spirited activity for some time to come. Discussions of its scope will be an aspect of this activity, and the Yale Conference on behavioral medicine (Schwartz & Weiss, 1978) represented a preliminary effort to define the field. However, it would be premature to attach lasting significance to definitions fated to be outmoded by unexpected directions the field eventually takes. Applications of behavioral science principles will fill whatever void they must. Because of this, the compass of "behavioral medicine" may extend beyond boundaries fixed by the best informed judgment of what it should be.

There are a variety of professional and legal issues sparked by the field of behavioral medicine, and it would be a mistake to view these simply as a batch of problems limited to this field. On the contrary, somewhat broader issues surface here. It may be no exaggeration to say that forces responsible for the creation of a field that, among other things, integrates medicine and behavioral science will come to affect profoundly our conception of each. Because of this, it would be instructive to review some historical, sociological, and theoretical themes playing an important part in the rapidly increasing interest in the field.

D. A. BEGELMAN • Three Corners, West Meetinghouse Road, New Milford, Connecticut 06776.

HISTORICAL AND SOCIOLOGICAL THEMES

According to the more traditional conceptions of professional activity in behavioral sciences like psychology, contributions to prevention, diagnosis, therapy, or rehabilitation were, with the exception of obvious or time-honored areas of overlap, seen as interventions to be carefully distinguished from those of medicine. State licensing laws backed up by a kind of disciplinary chauvinism commemorated this urbane version of territoriality. Nevertheless, the time-honored and protected tradition of separation of the disciplines was bolstered by an illusory view of the relationships among them. Radical role modifications, engendered by the rapid increase in knowledge and the demand for applications, tended to break down hard and fast Maginot lines between disciplines. This process has always been a feature of the growth of the sciences and the helping professions because technological innovation on the heels of increased specialization has given rise to areas of interdisciplinary overlap both inevitable and impossible to predict. In spite of this, the myth of the absolute integrity of the disciplines has lived on, reinforced by a distorted view of the development of the sciences. The compass of a discipline considered to be restricted to its practitioners has often been advertised as compelling evidence of the integrity of that field, whereas less attention has been given to the tendency for that uniqueness to shrink appreciably over time! The process is no better illustrated than by the case of "psychotherapy."

Although most of the dust has settled over the hoary debate as to whether nonmedical practitioners are qualified to do psychotherapy, physicians who felt otherwise defined the problem as the practice of medicine by nonphysicians.[1] Currently, several professions participate in the practice of psychotherapy. Despite the implications this historical reality has for our understanding of what "medicine" actually is, the integrity of the field as one properly confined to physicians is maintained in this case by finessing the problem of psychotherapy. Specifically, psychotherapy is now designated as an interdisciplinary field rather than as a medical practice for which nonphysicians have exhibited a misplaced

---

[1]Jurisdictional skirmishes over the "medical" nature of psychotherapy still survive, although in a somewhat cloaked form as conflicts about third-party payments by insurance carriers. For example, a federal district court recently struck down a claim by psychologists in Virginia charging a violation of the Sherman Anti-Trust Act by Blue Shield and psychiatrists conspiring to impede direct reimbursement to psychologists. Issues of the *APA Monitor* and *Psychiatric News* featured articles on the litigation somewhat slanted in the direction of the respective disciplinary biases. Even within psychology and psychiatry, however, there is a lack of consensus on the problem of psychotherapy. Many psychologists, though acknowledging the fact of interdisciplinary overlap, experience dissonance between the rejection of psychotherapy as a medical practice and the wish to be reimbursed through carriers of *health* insurance. On the other hand, a handful of psychiatric commentators (Szasz, 1979) have argued that the view of psychotherapy as being both literally a "therapy" and a medical enterprise is badly in need of demythologizing.

aptitude! Such slants on the proper classification of professional practice
fortify the notion that there is something immutable about a specialty
underneath that aspect of its evolution ushered in through technological
refinement. Obviously, the practice of medicine must be confined to
physicians if, as in the case of psychotherapy, an activity is no longer
called *medicine* when mongrelized.

The creation of a field of behavioral medicine, aside from its implica-
tions for opportunities of interdisciplinary exchange and collaboration,
has profound import for the practice of psychology. One of the most
significant of these implications is the relationship of the psychologist to
the medical specialist. Since World War II, contributions by psychologists
to the clinical welfare of patients under medical jurisdiction has been
routed largely through psychiatry, whatever the nature of the professional
service performed. Alternatively, direct collaboration with such
specialists as neurologists, cardiologists, dermatologists, orthopedic
specialists, and internists has been rare. Usually, referral to a psychologist
by any of these medical specialties came only after a "functional" com-
ponent of a problem was diagnosed and the physician felt professionally
obliged to farm the patient out to someone qualified to deal with this
dimension. Since the functional aspect of medical problems was also the
prerogative of the psychiatrist, determination of which practitioner
should accept the referral was often influenced by such variables as pro-
fessional loyalties, expense to the patient, reputation of the practitioner
in question, and consultant availability, particularly in "medical" set-
tings such as hospitals.

Historically, clinical psychologists have sought to develop forms of
professional practice that are distinct from psychiatric practice, and the
creation of the profession during World War II was sparked by the need for
more systematic psychodiagnostic services than psychiatry was capable
of providing. An enormous impetus to differentiating these two fields was
the growth of behavior modification starting in the 1950s (Skinner, 1953;
Wolpe, 1958). Behavior modification, although a range of diverse ap-
proaches to deviant behavior, represented more than anything else the
adoption of an experimental or research-oriented approach to deviant
behavior. Taking its lead from "learning theory" and experimentally de-
rived principles of animal research, behavior modification came to chal-
lenge the central assumptions of therapeutic approaches owing their al-
legiance to trait theory and psychodynamic theory (Goldfried & Kent,
1972; Mischel, 1968, 1973, 1977). Aside from questions pertaining to the
validity of the behavioral approach, its sociological impetus is partially
explained by the perceived need for psychologists to differentiate them-
selves from the then prevailing models of psychiatric theory. Behavior
modification was, in effect, a liberation movement for psychologists, and
also for psychiatrists who, jaded on the psychodynamic trends of their
own profession, joined them in collaborative efforts that were later to
provide the framework for interdisciplinary ventures in the field of be-

havioral medicine. In fact, a majority of workers who are nonphysicians and are currently contributing their expertise to the growth of behavioral medicine are behaviorally oriented psychologists.

If the development of behavioral medicine is closely linked to antecedent trends within behavior modification, an ostensible discontinuity between both fields remains to be clarified. In the effort to disengage itself from medicine in general and psychiatric umbrage in particular, behavior modifiers emphatically rejected the medical model as it encompassed the explanation and treatment of behavior disorders (Ullmann & Krasner, 1969). The rejection was much more pronounced in the earlier, polemical phase of the behavior modification movement, a phase characterized by somewhat sweeping claims for learning theory and environmentalism[2] (Ayllon & Michael, 1959; Eysenck, 1960; Ullmann & Krasner, 1965). It may be that, in the effort to chart a new paradigmatic course for psychology, rejection of the medical model frequently took the form of extravagant denials of the role of biogenic impairment and the unimportance of the neurophysiological substratum. Later on, partial retrenchment from the earlier position could be observed, as previously underemphasized implications of certain data were brought to light (Breland & Breland, 1961; Herrnstein, 1977; Seligman, 1971). A stabilized professional identity, together with increased opportunities for collaboration with physicians in areas like behavioral medicine, have enabled behavior modifiers to adjust some of the intellectual dislocations of the past (Hersen, 1979). However, it should be remembered that what strikes us now as limiting in older theoretical postures nevertheless may have had an important place in the growth of the discipline. Theoretical mistakes and diversions can mean as much to the sociology of a profession as being relentlessly on target.

If earlier rejection of the medical model weakened intellectual ties to psychiatry, what sociological forces account for the realignment of behavior modification with medicine through behavioral medicine? The possibility of such a rapprochement should be increased by professional capabilities significant enough to vitiate the former ideological stance of behavior modification. Behavioral medicine does, indeed, offer such possibilities. It promotes collaboration between nonpsychiatric medical specialties and behavioral scientists, thus reducing to some extent the perceived handicap of an alliance with medicine through psychiatry ex-

---

[2]A characteristic blunder of the polemical phase of early behaviorism was the failure to distinguish between the etiology and the maintenance of behavior disorder, between the variables causing a problem and those reinforcing it. It does not follow from the fact that behavior therapy can alter a deviant pattern that a learning process was originally responsible for it. Nor does it follow from the demonstrable physiological or organic nature of a problem that forms of behavior modification are unsuitable for treating it or that its treatment should necessarily be in the hands of a physician. Such mistaken implications are more fully discussed elsewhere (Begelman, 1971; Davison, 1969; London, 1972; Rimland, 1969).

clusively. In addition, it would seem to offer attractive prospects of collaborative coequality. The possibility for contributions to nonpsychiatric medical specialties is a predictable outcome of a behavioral orientation. Since the boundaries of psychiatric practice are fixed by developments within that discipline itself, there is no reason why useful applications of behavioral principles must invariably coincide with a "psychiatric" subject matter.

TYPES OF PROFESSIONAL COLLABORATION

Whatever the differences among definitions of behavioral medicine articulated by groups of investigators such as those convened at the Yale Conference in 1977 or at the Academy of Behavioral Medicine Research in 1978 (Weiss, Clayman, & Cataldo, 1978), there is common agreement that the field is an interdisciplinary one. Yet the notion of an interdisciplinary focus is itself ambiguous, in that it can comprise several rather distinct types of applied endeavors. First, a project can be interdisciplinary in the sense that it represents a collaboration between specialists in biomedicine and those in behavioral science. Terms like biomedical specialty and behavioral science are generic. They need not be confined to medicine and psychology, respectively, although many current and future projects undoubtedly will involve this type of collaboration. As we shall see, rather complicated legal and professional issues surface when behavioral medicine takes the form of a collaboration between specialists from separate disciplines. Aside from psychology and the various subspecialties of medicine, the Academy of Behavioral Medicine Research has enumerated other disciplines it views as potentially collaborative fields in behavioral medicine research. These include anthropology, biostatistics, dentistry, epidemiology, health education, nursing, nutrition, pharmacology, physiology, and sociology.

Second, a behavioral medicine project can be interdisciplinary in the sense that it represents an integration of knowledge from biomedical and behavioral sciences, even though it does not involve the formal collaboration of two or more professionals from these fields. In this kind of investigation, a behavioral scientist such as a psychologist may undertake a research problem on an admittedly physical disability such as obesity (Kirscht, Becker, Haefner, & Maiman, 1978) or cancer (Fox, 1978), where values of the dependent variable can be obtained through interviews, published reports, records, or other types of statistical data in the absence of a collaborative effort on the part of, say, a physician. These behavioral science projects pose fewer questions concerning legal and professional issues than do collaborative studies. Obviously, when manipulation of the independent variable has few implications for the modification of customary professional roles, contributions to behavioral medicine can be made without the inconvenience of newer types of adaptation.

Collaborative behavioral medicine can itself be of several different types. For example, it can represent an effort in which biomedical and behavioral scientists are true coinvestigators, each contributing expertise indispensable to the realization of a project. Such an arrangement is most probably envisioned as an "ideal" one in behavioral medicine, since there is reciprocity between co-workers, as well as between distinguishable bodies of knowledge or disciplines. However, collaboration can be of another type. One collaborator might assume a supervisory role in the collaboration, sometimes in the absence of a coinvestigative relationship as previously defined. For example, when the behavioral medicine project involves the development of a procedure, device, or therapeutic manipulation directly affecting the client's physical well-being, issues pertaining to medical accountability have invariably arisen. Historically, clarification of the jurisdictional responsibilities of collaborators in relation to feature of the project. Usually, physicians have assumed the supervisory role in such projects when undertaken in collaboration with nonmedical investigators. The concept of a *supervisory relationship* is a jurisdictional one, although it is not limited to decision making directly affected by a client's plight in response to a therapeutic intervention. For example, if, during the course of a study on hospitalized patients, public pressure is brought to bear against conducting it, or if it poses problems for shifting administrative policies, or if coinvestigators have an altercation, then the "supervisor" has the discretionary power to terminate the investigation. Supervisory powers can also be vested in administrative gatekeepers— officials whose decisions directly affect the course of an investigation but whose relationship to it may be remote. The possible combinations of collaborative, coinvestigative, and supervisory relationships among two or more colleagues in a behavioral science project can be set forth as follows:

Type 1: Collaborative relationships in which no participant serves as supervisor or has coinvestigative status. An example might be a collaboration in which information, data, or a methodological element necessary to completion of the project is supplied by an individual who is neither involved in the study nor claims jurisdiction over it.

Type 2: Collaborative relationships similar to type 1 but where one of the participants, in virtue of legal or administrative powers, exercises supervisory jurisdiction from a distance. The relationship between a behavioral science researcher and a hospital superintendent or his representative committee might illustrate such a relationship.

Type 3: Collaborative relationships in which participants share coinvestigative status but where the supervisory element is absent due to minimal legal implications of the study. An example might be a joint undertaking by two or more behavioral scientists or between a medical and behavioral researcher on the problem of essential hypertension, where the former collaborator merely supplies epidemiological data and the later performs statistical manipulations in a coauthored project.

Type 4: Collaborative relationships in which coinvestigative status

obtains but where one of the participants assumes jurisdictional powers over the course of the collaboration. Obviously, any study undertaken for the benefit of an individual patient, and involving procedures directly affecting his or her health, would as a rule fall in this category.

When research collaborators from separate disciplines share coinvestigative status as in the type 4 relationship, issues of legal accountability are compounded in the absence of a clearly defined legal or supervisory element. The problem is somewhat offset by safeguards inherent in initiating institutional research. In recent years, increasingly exacting standards for the conduct of research on human subjects have been laid down (American Psychological Association, 1973). Because of this, the kind of latitude granted to researchers a decade or more ago has been radically diminished. Federal, state, and disciplinary guidelines for research with human subjects have thus drastically reduced the possibility of deviation from accepted codes of professional behavior. Even in cases of behavioral medicine projects poorly formulated from the standpoint of accountability, ethical safeguard to subjects, or other legal considerations, institutional screening procedures are usually designed to discriminate and rectify such weaknesses. At any rate, decreasing the risks to subjects inherent in a research proposal is not only facilitated by the attention currently given to these matters, but also by the number of hurdles a proposal must survive before its authors are permitted to initiate their project. On the other hand, the possibilities for research on the part of investigators lacking a supervisory capability are not as limited as they appear. In the case of a project workable from the purely methodological standpoint whose authors are ineligible for medical supervisory status, the proposal can be brought under the provisions of the type 2 relationship. This might involve the assignment of supervisory authority over the conduct of the investigation from the ranks of other institutional personnel with the requisite skills.

ETHICAL AND LEGAL ISSUES

Behavioral medicine poses special legal and ethical issues for behavioral scientists who contribute to it. Basically, these issues can be categorized as those (a) stemming from the collaborative nature of an intervention, (b) pertaining to competence and certification, (c) pertaining to the development of a new technology, particularly as regards the employment of behavioral instrumentation or devices, (d) pertaining to increased risk to clients, and (e) pertaining to the legal classification of interventions.

Legal Problems of Collaboration

As was already mentioned, particular types of collaborative arrangements between designers of some behavioral medicine projects would

appear to pose less risk of legal complications than others, as in cases grouped under the type 1 and 4 relationships. Generally speaking, ethical or legal questions or complexities pertaining to more serious issues of accountability arise in conjunction with direct therapeutic services to clients. More significantly, research or therapeutic interventions involving the "laying on of hands," or instrumental adjustments or invasions are of particular importance in this regard.

Although the notion of a supervisory relationship between a physician and a behavioral scientist in an otherwise coinvestigative context might seem to hearken back to traditional arrangements with psychiatrists, there are also advantages incurred. First, the supervisory element in a collaboration is a legal one designed to resolve numerous ambiguities in laws covering such collaborations. The element is not necessarily a concession to the exclusively "medical" nature of the intervention in any sense except that which makes for legal clarity in the event of a malpractice suit or other serious charge. Despite considerable statutory ambiguity as to the distinction between "medical" and "behavioral" problems (Schwitzgebel, 1978a), the law would ordinarily be partial to interpreting many collaborations in behavioral medicine as involving medical problems or interventions. Obviously, sensible legal clarification between the two categories should be made a goal of scientists properly qualified to consult with lawyers. However, such clarification will take time, and supervisory collaborative relationships may constitute the lesser of two evils in advance of obtaining eventual refinement of the law. In addition, because the welfare of the client is the paramount ethical mandate (American Psychological Association, 1977), it can be argued that legal formulations of collaborations designed to simplify and facilitate harmony among clients and therapists should be endorsed on the basis of this ethical principle.

A similar principle should govern disagreements on ethical or legal issues among collaborators from different disciplines. Although one would be hard pressed to specify instances of actual conflict or inconsistency among the ethical codes of collaborating professions, a disagreement between researchers from separate disciplines might hinge on the interpretation of these codes. In this event, there are several alternatives. Collaborators can (1) withdraw from the project, (2) seek counsel from colleagues in their respective disciplines with the aim of achieving consensus before initiation of the project, or (3) adopt the most conservative ethical approach. The third option might be hypothetically illustrated by a disagreement among collaborators as to satisfying criteria for obtaining informed consent from clients participating in an experimental project utilizing an implanted device. If the disagreement can be analyzed as one involving the necessity for inclusion of a particular procedural element, a conservative solution would be to include the element. It is possible that most potential disagreements among collaborators from separate disciplines would boil down to this type. In interdisciplinary projects, such a

modus vivendi would constitute a rational approach to the resolution of ethical conflicts. Where the ethical conundrum is of a different type, and further efforts to resolve it are unavailing, it would be in keeping with the ethical codes of all professions for one or more collaborators to disassociate from the project, as in the first option.

Competence and Certification

Competence requirements for professional practice are a recognized and highly stressed feature of any code of disciplinary ethics. Competence itself is an achievement level of expertise satisfying formal criteria set forth within a discipline. Obviously, therapeutic interventions involving such atypical psychological procedures as those found in behavioral medicine—elaborate technologies of measurement, biofeedback, and instrumental armamentaria for the treatment of migraine, hypertension, phobias, eating disorders, sexual dysfunctions, urological problems, psychophysiological problems, neurological problems, and the like— would seem to require exacting standards of professional competence. On the other hand, most of the technology unique to the field of behavioral medicine is quite new. This presents a problem, because if competence is wedded to the notion of an achievement level established by traditional or long-term uses of a technique, fresh applications of novel techniques cannot be as readily assessed as conforming to ethical standards. Rather than impugning innovations in behavioral medicine, this consideration actually represents a paradox for all disciplines that link competence to such criteria. An overly strict insistence on the necessity of satisfying the criterion of requisite experience with a particular technique would all but negate the possibility of innovation in any field! Indeed, leaders within the disciplines who introduce such innovations usually do so in highly controlled medical school, university, or institutional settings. Moreover, the fact that the procedure is innovative usually promotes an attitude of vigilance and sensitivity to the possibility of experimental hazard. Furthermore, in an innovative field like behavioral medicine, the requirement that every technological advance be considered sui generis in relation to competence might be too stringent. Competence skills developed in relation to one technique most probably generalize to others distinct from it. Experience with EMG technology (Budzynski, Stoyva, & Adler, 1970), for example, would transfer to technical skills with EEG technology (Mostofsky & Balascah, 1977). Rather than lamenting the implications technological ingenuity poses for more traditional criteria of competence, leaders in the field should give some consideration to similarities among categories of newer techniques in behavioral medicine. Ethical concerns about a practitioner's competence in using a particular technique would be correspondingly lessened by adequate experience with another technique sufficiently analogous to it.

Certification has been a disciplinary procedure aimed at the promo-

tion of two discernible ethical objectives: (1) the upgrading of professional competence in a chosen area, and (2) the separating out of practices that are fraudulent or that fall short of acceptable standards of practice for the discipline. These two objectives are related in the following manner. The social visibility of a certification procedure directly affects the ability of the consumer to properly assess the quality of professional service. To the extent that consumption is influenced by such criteria, fraudulent or less than adequate standards of practice will diminish because they cannot successfully compete. Obviously, certification of competence is an earmark of professional practices that have had ample time to develop. The situation is, as we have seen, rather different for the field of behavioral medicine, since many of its applications must be regarded as in the experimental stage of development. In spite of this, the field would appear to possess some safeguards by virtue of its interdisciplinary scope. Thus, the probability of a fraudulent or unacceptable application of behavioral medicine is understandably decreased in interdisciplinary contexts like clinics, hospitals, or university settings where the air is charged with professionalism and screening procedures tend to be detailed. The opposite is true with respect to modalities like biofeedback that may be visited as panaceas on an uninformed public by private practitioners ignorant of their limitations (Blanchard & Epstein, 1978; Plotkin, 1976; Silver & Blanchard, 1978). The present author has personally observed a rash of biofeedback "institutes" in the state of Connecticut, many of which are housed in the consulting rooms of psychoanalysts who go about their business blithely unperturbed about the possibility of symptom substitution (Cahoon, 1968)!

Obviously, the tendency for any behavioral medicine intervention to directly affect a client's physical well-being will strengthen arguments for the eventual certification of behavioral scientists who offer these services. In a somewhat related area of ethical concern, that of applied behavioral analysis, Risley (1975) has suggested that certification of expertise should be applied to therapeutic procedures, rather than to the practitioners administering them. The advantage of such a proposal is that it offsets potential problems arising over cases in which practitioners, otherwise competent to administer techniques for which they have been trained, also administer those for which they are scientifically, but not legally, unqualified. Its disadvantage, however, might become apparent in settings where demands for behavioral medicine applications are made so frequently that certification procedures for otherwise skilled and competent researchers could have a retrograde effect on addressing client needs as swiftly as possible. However, this argument is hardly a compelling one against Risley's proposal, since supervisory arrangements between behavioral scientists, one of whom is already certified in the procedure, might be established. Indeed, university centers might avail themselves of behavioral medicine "itinerants," or free-lancers: scientists who, in addition to their own professional involvement, take on additional respon-

sibilities to train or certify others. Such itinerants, by virtue of their expertise, could be authorized to offer a variety of training experiences, including workshops, consultations, and other services to scientists eager to become accomplished in the administration of the technique in question. However, it should be borne in mind that the development of such vehicles should adhere to guidelines set forth in disciplinary codes, such as *Standards for Providers of Psychological Services* (American Psychological Association, 1977). Many of these guidelines impose stringent requirements for training in the use of new modalities. Details of such arrangements for additional training can be spelled out in guidelines deemed appropriate for professional activities of this kind. A degree of vigilance should be exercised over charlatans who seek admission to such workshops for their own commercial motives.

Legal Problems of New Technology

Under the Medical Device Amendments Act of 1976, the federal government empowers the Food and Drug Administration to classify any type of instrumentation or device intended for use in behavioral medicine as a "medical device." Although not all devices have been classified as such by the FDA, what Schwitzgebel (1977) has called a "medical-political drift" is apparent in FDA policy. Specifically, the medical device amendments construe a medical device to be anything that is "intended to affect the structure or any function of the body" in relation to "the diagnosis of disease or other conditions, or in the cure, mitigation, treatment, or prevention of disease in man" (21 *United States Code* 321 h). Given such a definition, it is difficult to see how any case of behavioral medicine technology could avoid falling under these broadly construed characteristics. At the present time, panels of experts in the FDA are involved in the classification of numerous devices. The panels are staffed chiefly by physicians, and thousands of devices have to date been categorized based on several levels of regulatory standards. In one sense, it is immaterial to the progress of behavioral medicine who staffs FDA panels or how therapeutic devices are labeled, as long as judgment exercised in these matters serves long-range consumer interests. On the other hand, and as Schwitzgebel (1977, 1978a,b) has noted, FDA policy can indirectly (and perhaps illegitimately) regulate the professional practice of psychology in ways that arbitrarily limit its purview, with the possible result of disadvantaging the consumer. If the classification of a device as "medical" is tied to the idea of its use coming under medical supervision, countless techniques from biofeedback to the bell-and-pad apparatus for enuresis would necessitate medical supervision if legal problems are to be averted. This resolution is unacceptable to many psychologists, especially in relation to techniques they feel they are more knowledgeable about than physicians.

FDA regulations may be less hampering in interdisciplinary settings

where behavioral medicine projects involve productive relationships with physicians, enabling nonmedical researchers to deal with legal biases comparatively unruffled. On the other hand, it should be borne in mind that the FDA, like many other regulatory agencies, may be largely unaware of the implications for psychology of certain of its rulings. Quasi-medical interventions in behavioral psychology have scarcely been an ancient or common practice in the profession as a whole, and educational programs designed to bring some of the newer forms of behavioral intervention to the attention of functionaries at all levels of government may be a necessary, albeit sustained, undertaking.

The FDA has also published a list of legal standards for the use of potentially hazardous behavioral equipment. These standards cover natural hazards in the employment of, for example, electrical equipment. Butterfield (1975, 1979) has outlined specific steps psychologists should take to ensure that the use of any behavioral device or equipment meets satisfactory standards in conjunction with therapeutic procedures. These include procedures for obtaining equipment specifications from distributors, the determination of compliance with FDA standards for the manufacture, testing, and checking of the equipment, and procedures for safeguarding clients against its potentially hazardous use. Understandably, accidents with the use of electrical devices might establish alarming precedents for limitations on their use in ways that come to disadvantage clients in desperate need of them.

Increased Risk

Behavioral medicine interventions involving procedures or devices directly affecting the physical integrity of the client are at high risk. In fact, they can approximate the legal risks associated with forms of medical practice. Under such circumstances, the possibility of negligence or malpractice is increased considerably over what it is in connection with more traditional kinds of psychological practices such as verbal psychotherapy. Should clients being administered such procedures subsequently bring negligence or malpractice suits, insurance carriers may wish to increase the cost of professional protection to psychologists collaborating in behavioral medicine treatment programs. Higher insurance rates for psychologists in general could be one outcome of the proliferation of techniques the use of which incurs this type of legal risk. On the other hand, if such techniques remain confined to a minority of behaviorally oriented workers in the field, differential schedules of rates could be assigned, depending on the kind of professional activity involved. Such a scheme would parallel the one carriers apply to general medicine. The cost of malpractice insurance for the orthopedic surgeon, for example, is much greater than for the pathologist, and astronomical compared to the cost currently charged practicing psychologists. At any rate, as psychologists in behavioral medicine press for parity of professional status with

collaborative partners in medicine, legal repercussions of a negative, as well as a beneficial, type will undoubtedly be felt over time.

Legal Classification of Interventions

The notion that interventions directly affecting the physical well-being of a client are prima facie medical or that persons involved in such interventions necessarily qualify for medical supervision is simply false. The law currently recognizes the existence of quite a number of physical conditions or diseases the treatment of which does not require the permission of, or supervision by, physicians. Moreover, these are conditions that, if mismanaged therapeutically, can result in devastating consequences to the health of the patient involved. The reference here is to the therapeutic procedures of dentistry, optometry, oral surgery, chiropractic medicine, and so forth. Indeed, a distinction must be drawn between conditions legally necessitating medical supervision, those actually necessitating it, and, finally, those the medical profession construes as coming within its proper jurisdiction. It is not patent that all these coincide; the second and third criteria have, over the years, been ungummed in relation to countless modalities, including psychotherapy. The problem, however, is a complex one. If an intrinsic need for medical supervision is not established by the mere prejudices of medical societies on this score, the sword cuts both ways. A conviction on the part of nonphysicians that the need for such supervision is nothing other than the expression of a disciplinary prejudice is hardly proof that it is. What is needed here is a detailed analysis of particular kinds of conditions, with an eye toward the development of rational policies. This would require more intimate knowledge of the scope and problems of other disciplines than can possibly be achieved in a climate of distrust or animosity. Perhaps what are really needed are interdisciplinary environments of the kind we are beginning to see take shape in behavioral medicine. The goal, however, is easier said than accomplished. Perhaps behavioral medicine, or interdisciplinary fields like it, can provide the fertile soil in which the spirit of collaboration can create requisite contingencies for the resolution of the kinds of problems we have been discussing.

REFERENCES

American Psychological Association. *Ethical principles in the conduct of research with human participants.* Washington, D.C.: Author, 1973.

American Psychological Association. *Ethical standards of psychologists* (rev. ed.). Washington, D.C.: Author, 1977.

Ayllon, T., & Michael, J. The psychiatric nurse as behavioral engineer. *Journal of the Experimental Analysis of Behavior,* 1959, 2, 323–324.

Begelman, D. A. Misnaming, metaphors, the medical model, and some muddles. *Psychiatry,* 1971, 34, 38–58.

Blanchard, E. B., & Epstein, L. *A biofeedback primer.* Reading, Mass.: Addison-Wesley, 1978.

Breland, K., & Breland, M. The misbehavior of organisms. *American Psychologist,* 1961, *16,* 681–684.

Budzynski, T. H., Stoyva, J., & Adler, C. S. Feedback influenced muscle relaxation: Applications to tension headache. *Journal of Behavior Therapy and Experimental Psychiatry,* 1970, *1,* 205–211.

Butterfield, H. Electric shock—safety when used for the aversive conditioning of humans. *Behavior Therapy,* 1975, *6,* 98–110.

Butterfield, W. H. Safety, ethical, and legal standards for instrumentation in therapy and research. *American Psychologist,* 1979, *4,* 365–366.

Cahoon, D. D. Symptom substitution and the behavior therapies: Reappraisal. *Psychological Bulletin,* 1968, *69,* 149–156.

Davison, G. C. Appraisal of behavior modification techniques with adults in institutional settings. In C. M. Franks (Ed.), *Behavior therapy: Appraisal and status.* New York: McGraw-Hill, 1969.

Eysenck, H. J. *Behavior therapy and the neuroses.* New York: Pergamon, 1960.

Fox, B. H. Premorbid psychological factors as related to cancer incidence. *Journal of Behavioral Medicine,* 1978, *1,* 45–135.

Goldfried, M. R., & Kent, R. N. Traditional versus behavioral assessment: A comparison of methodological and theoretical assumptions. *Psychological Bulletin,* 1972, *77,* 409–420.

Herrnstein, R. J. The evolution of behaviorism. *American Psychologist,* 1977, *32,* 593–603.

Hersen, M. Limitations and problems in the clinical application of behavioral techniques in psychiatric settings. *Behavior Therapy,* 1979, *10,* 65–80.

Kirscht, J. P., Becker, M. H., Haefner, D. P., & Maiman, L. A. Effects of threatening communications and mother's health beliefs on weight change in obese children. *Journal of Behavioral Medicine,* 1978, *1,* 147–158.

London, P. The end of ideology in behavior modification. *American Psychologist,* 1972, *27,* 913–920.

Mischel, W. *Personality and assessment.* New York: Wiley, 1968.

Mischel, W. Toward a cognitive social learning reconceptualization of personality. *Psychological Review,* 1973, *80,* 252–283.

Mischel, W. On the future of personality measurement. *American Psychologist,* 1977, *32,* 246–254.

Mostofsky, D. I., & Balascah, B. A. Control of seizures. *Psychological Bulletin,* 1977, *84,* 723–750.

Plotkin, W. B. On the self regulation of the occipital alpha rhythm: Control strategies, states of consciousness, and the role of physiological feedback. *Journal of Experimental Psychology,* 1976, *105,* 66–99.

Rimland, B. Psychogenesis vs. biogenesis: The issue and the evidence. In S. C. Plog & R. B. Edgerton (Eds.), *Changing perspectives in mental illness.* New York: Holt, Rinehart & Winston, 1969.

Risley, T. Certify procedures not people. In W. S. Wood (Ed.), *Issues in evaluating behavior modification: Proceedings of the first Drake conference on professional issues in behavior analysis.* Champaign, Ill.: Research Press, 1975.

Schwartz, G. E., & Weiss, S. M. Yale conference on behavioral medicine: A proposed definition and statement of goals. *Journal of Behavioral Medicine,* 1978, *1,* 3–12.

Schwitzgebel, R. K. Federal regulation of psychological devices: An example of medical-legal drift. In B. D. Sales (Ed.), *Psychology in the legal process.* New York: Spectrum, 1977.

Schwitzgebel, R. K. Suggestions for the uses of psychological devices in accord with legal and ethical standards. *Professional Psychology,* 1978 (August), 478–488. (a).

Schwitzgebel, R. K. Regulation of research employing psychological devices and the use of self-help materials in therapy. *Behavior Therapist,* 1978, *1,* 9–10. (b)

Seligman, M. E. P. Phobias and preparedness. *Behavior Therapy*, 1971, *2*, 307–320.

Silver, B. V., & Blanchard, E. B. Biofeedback and relaxation training in the treatment of psychophysiological disorders: Or are the machines really necessary? *Journal of Behavrioal Medicine*, 1978, *1*, 217–239.

Skinner, B. F. *Science and human behavior.* New York: Macmillan, 1953.

Szasz, T. S. *The myth of psychotherapy.* Garden City, N.Y.: Anchor Books, 1979.

Ullmann, L. P., & Krasner, L. *Case studies in behavior modification.* New York: Holt, Rinehart & Winston, 1965.

Ullmann, L. P., & Krasner, L. *A psychological approach to abnormal behavior.* Englewood Cliffs, N.J.: Prentice-Hall, 1969.

Weiss, S. M., Clayman, D., & Cataldo, M. F. Developments in behavioral medicine. *The Behavior Therapist*, 1978, *1*, 3–4.

Wolpe, J. *Psychotherapy by reciprocal inhibition.* Stanford, Calif.: Stanford University Press, 1958.

PART I

GENERAL ASSESSMENT AND INTERVENTION PROCEDURES

CHAPTER 2

Operant Conditioning

JESSE B. MILBY

PURPOSE AND OVERVIEW

The purpose of this chapter is to familiarize the reader with the use of operant conditioning principles and procedures in assessment and intervention. Hopefully, this awareness will stimulate further study and eventual application to medical problems. In order to accomplish this objective, more emphasis has been placed on scope than on depth.

   The chapter reviews the conceptual foundations of operant conditioning. Classical and operant conditioning are presented as conceptual building blocks for understanding more complex forms of behavior. But the emphasis is on understanding the application of operant conditioning processes to medicine. A brief theoretical and historical context is provided along with a discussion of major dependent variables employed in operant conditioning approaches.

   Assessment is reviewed as both a conceptual and information-gathering process that continues after intervention has begun. Basic operant conditioning strategies, with elements common to all operant conditioning methods, are reviewed. Several treatment methods are then presented to accomplish each of the following objectives: (1) response initiation; (2) response increase or maintenance; (3) response reduction or elimination; and (4) restriction of responding to certain situations. Case examples for each of these methods are provided from the literature and the author's clinical experience.

JESSE B. MILBY • Chief of Psychology Service, Birmingham Veterans Administration Medical Center, Departments of Psychiatry and Psychology, University of Alabama, Birmingham, Alabama 35233.

These operant conditioning procedures are particularly attractive because they are noninvasive and generally free of side effects. Additionally, they have often been effective where conventional methods have failed or provided unacceptable levels of improvement.

INTRODUCTION TO CLASSICAL AND OPERANT CONDITIONING

Almost all of mankind's adaptive behavior is acquired through experience. Experience that shapes such adaptation can be conceptualized into two basic types, classical conditioning and operant conditioning. It is possible to derive many other forms of complex learning from these basic elements (Gagne', 1965). The fact that classical conditioning and operant conditioning may not be independent phenomena (Woods, 1974) does not detract from their usefulness in conceptualizing behavior and deriving more complex forms from them.

In classical conditioning, we generally observe the response of the individual's smooth muscles and glands rather than some response that involves striated musculature, such as in the finger, arm, or leg. Some critical event, by convention called an unconditioned stimulus (UCS), that normally produces a response (unconditioned response, UCR) is repeatedly associated with some other neutral event (conditioned stimulus, CS). After many repetitions, the CS, when presented alone, will be followed by a conditioned response (CR) like the response to the UCS. This classical conditioning paradigm is illustrated in Figure 1.

In operant conditioning, a critical event like a UCS, called a rein-

Early Acquisition

UCS   →   UCR
food   Salivation
CS
light

Late Acquisition

No food   ↗   CR
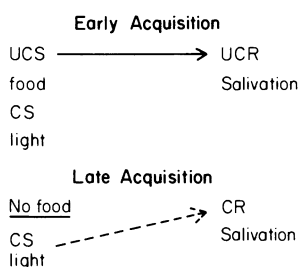   Salivation
CS - - - - -
light

Figure 1. The classical conditioning paradigm. In early acquisition, the CS (light) is repeatedly paired with the UCS (food). In late acquisition, after repeated pairings of CS and UCS, presentation of the CS alone elicits conditioned salivation.
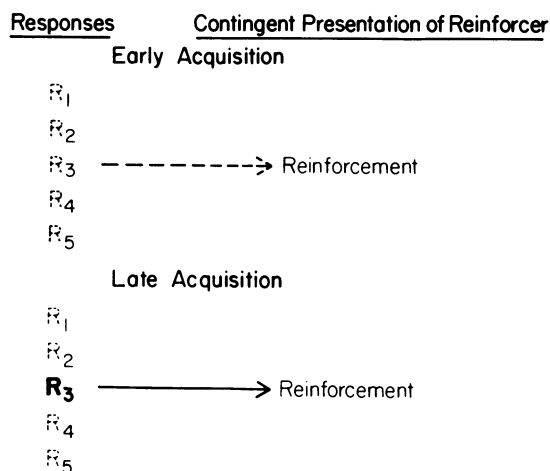
Responses   Contingent Presentation of Reinforcer

Early Acquisition

R_1

R_2

R_3 — — — — — — — —$\rightarrow$ Reinforcement

R_4

R_5

Late Acquisition

R_1

R_2

R_3 ——————————$\rightarrow$ Reinforcement

R_4

R_5

Figure 2. The emergence of an operantly conditioned response. During early acquisition, the target response, R_3, is no more likely to occur than the other responses, R_1, R_2, R_4, and R_5. When reinforcement is delivered contingent on R_3, it gains in strength, that is, becomes more probable. In late acquisition, R_3 becomes the most probable response in the situation as a function of its contingent relationship with reinforcement.

forcer, is presented contingent on some response. In the early stages of operant conditioning, many responses are typically occurring, but when the reinforcer is contingent on only one of them, that particular response occurs more frequently until it predominates. The predominance of one response over others as a function of the response-contingent reinforcement is one way of describing the acquisition of a response during operant conditioning. The emergence of an operantly conditioned response is illustrated in Figure 2.

Historically, scientists thought that classical conditioning was limited to smooth-muscle and glandular responses and operant conditioning to responses involving striated musculature (Kimble, 1961). However, researchers have recently found that responses of smooth muscles, glands, and other response systems like the electrical activity of the brain can be operantly conditioned (Kimmel, 1967; Miller, 1969; Olds, 1969). Of course, the possibility that discrete physiological response systems can be controlled by operant conditioning procedures has extensive implications for medicine. These implications and the extent and utility of operant procedures in medicine are now being explored. Thus, it is appropriate that operant conditioning procedures be examined in some detail so that their potential and actual application can be surveyed. Not only are physiological responses important for medicine, but other behavior is critical to the health professional's task. The acts of going to a physician, reporting pain or symptoms, taking medication, following a diet, activity

or exercise regimen, and so on, are all operantly conditionable responses. Such responses are under contingent-reinforcement control and therefore are lawful and predictable. When physicians and other health care professionals understand this lawfulness, the knowledge can be utilized to increase effectiveness of medical care. On the other hand, to the extent that they are unaware of the lawfulness of operantly conditionable health care behaviors, effectiveness of medical care can be compromised.

THEORETICAL BASIS FOR OPERANT CONDITIONING APPROACHES TO BEHAVIORAL MEDICINE

The behavioral scientist makes the assumption that all behavior is lawful. It conforms to the empirical law of effect (Thorndike, 1898), which states that behavior is affected by its consequences in a systematic way. Behavior producing positive consequences tends to be increased and maintained. Behavior producing negative consequences tends to be decreased and eliminated.

All of the operant conditioning approaches have the same roots in learning theory stemming back to Thorndike. However, it is possible to trace two branches from this source. One branch, which has perhaps remained closer to the "taproot" of learning theory, is the work on basic *psychophysiology.* It has provided the empirical and theoretical underpinnings for biofeedback. The seminal work in this area was done by active researchers and theorists involved in learning theory research (Brener & Hothersall, 1966; Kimmel, 1967; Miller, 1969; Miller & Banuazizi, 1968; Miller & DiCara, 1968; Trowill, 1967). Much initial work was stimulated by concern with whether smooth-muscle and glandular responses, typically classically conditioned, could be operantly conditioned too. This research has led to further development of psychophysiology and to the whole area of biofeedback. Biofeedback is thus a natural technological outgrowth of basic research in operant conditioning. In biofeedback an individual is provided with information about a physiological response that is normally out of awareness and conscious control. Information regarding the moment-to-moment status of a physiological response is given. When reinforcing or punishing consequences are made contingent on a specified alteration of response, control over physiological response has been demonstrated (see Chapter 5).

The second branch stems from the work of Skinner (1938, 1953) and his colleagues (Ferster & Skinner, 1957). Skinner developed a method for instrumental conditioning that allowed the animal to freely operate within an environment without use of trial-by-trial observation, start boxes, and so forth. This allowed constant monitoring of a freely behaving organism over time. The method became known as the *free-operant method* for instrumental conditioning. Eventually, all instrumental conditioning was also called operant conditioning by some psychologists.

From this initial work a whole technology of operant approaches to behavior modification and instruction have evolved. Also, many operant approaches to health and pathognomonic behavior change have developed from this branch.

MAJOR DEPENDENT VARIABLES

The selection of a dependent variable in a treatment strategy is extremely important. There are major differences in dimensions of response strength. Depending on how response strength is defined, procedures to accomplish behavior change can have dramatically different effects (Gilbert, 1958).

Given this caveat, the wise clinician will pay careful attention to defining the response strength. The major dependent variable used in clinical application of operant procedures is response *rate*. Rate is usually based on a sample of response frequency during a specified time. The clinician should articulate different response strength measures that might be useful with some rate measure if possible. This approach is especially important when a procedure or response described in the literature is applied in different clinical circumstances.

Intensity of a response is sometimes more important clinically than frequency. This can be utilized by defining the response in terms of frequency of X intensity. This utilizes frequency per unit time (i.e., rate) as the dependent variable. But the critical intensity dimension is a defining criterion for the response. Rate can be used in the same way when *latency* is the response dimension of interest. It can be used as a defining criterion for the response. Such rate measures can achieve the flexibility and sensitivity necessary for application to varied response dimensions by incorporating other relevant response dimensions as defining criteria.

OPERANT PROCEDURES FOR ASSESSMENT

Most of the time, assessment of a "psychogenically" based disorder is made by exclusion. Numerous tests and diagnostic procedures are completed, and, when no organic pathology can be detected, the disorder is diagnosed as psychogenic. Though this is a viable diagnostic strategy as far as it is carried, the problem is that discovery of the psychogenic cause is often ignored. Once it is determined that the disorder is psychogenic, it is often assumed that psychogenic basis is as far as the assessment needs to be carried. Typically, some antianxiety agent is prescribed to deal with the psychogenic aspect, and the treatment goes no further.

More problematic is the assessment of psychogenic factors when they are masked by the presence of a known organic etiology. Psychogenic factors in situations like this are often completely ignored.

Only after the treatment of choice for the organic etiology is utilized and the patient continues to experience difficulty are psychogenic factors considered. The problem is often a conceptual one. Because of known organic etiology, it is often tacitly assumed that psychological variables are noncontributory.

Despite an organic etiology, there are many times when a disorder is maintained by behavioral factors. For example, neurodermatitis with a known etiology is often maintained by excessive concern and attention from family members. Powerful rewards are often set up for scratching behavior, which then perpetuates the skin disorder. Family and self-concern can also increase emotional tension, itching sensations, and the urge to scratch. These feelings are then reduced by scratching, thereby reinforcing the scratching behavior. But scratching exacerbates the skin disorder and thus maintains the emotional factors in a vicious cycle of tension–skin irritation–scratching–skin irritation–tension.

Once it is determined that some form of pathology is maintained by psychological factors, a whole assessment process, not unlike the process to discover the locus and cause of physical pathology, must be completed. The usual strategy is through careful observation, interview, and psychological testing to narrow the focus and to identify psychopathological responses and their maintenance variables. The assessment process often differs with the theoretical orientation of the assessor, especially the level of conceptualization and degree of focus. The operant conditioning approach to assessment and treatment represents one orientation. Its hallmark is an assessment that identifies observable responses and the controlling variables.

Identification and Definition of the Response

One central feature of an operant conditioning paradigm is *focus*. Before operant conditioning treatment is employed, the function, response, or behavior should be sharply in focus for the clinician. Some focus may be achieved by fine measurement procedures and equipment, but ultimately the focus must be in the mind of the clinician, who must be able to specify exactly the response or function that he or she wishes to change. Writing a careful definition of the response is often essential. One critical test for the definition is utility, which, in part, can be judged by the degree of consensual validation achieved. Other criteria are needed when cognitive variables are the focus of attention.

Response definition is not usually a clinician's problem when dealing with physiological functions. Sophisticated measurement devices define the response, and development of new measures is a job for the basic researcher. But the clinician still must identify which response to target for intervention. That decision should be made after other factors in the assessment process are considered.

Identification of Response Context

Response context involves where the response occurs, when it occurs, with whom it occurs, and what its consequences are. Depending on the target response, *where* may be a locus in the body or subsystem or a particular place in the environment. Careful assessment will often show that where a response occurs exerts exquisite stimulus control over the response. For example, eating of anorexic and obese patients is often under stimulus control of one location. Commonly, "binge" eating occurs only when patients are alone in their own kitchen. Discovery of such stimulus control becomes important in planning intervention.

Temporal context of the response is also important. Its temporal aspects, especially its relation to other events close in time, are often a key to determining discriminative or eliciting stimuli. For example, the fact that vomiting only occurred just after meals and closely followed observation of thumb sucking, mouth movements, and reverse peristalsis became a key assessment observation for treating the life-threatening ruminative vomiting of a 9-month-old infant (Lang & Melamed, 1969). Precursor sucking movements and reverse peristalsis were later used in successful operant conditioning treatment.

The social context of the response is also critical for delineating stimulus control. Often, a problem behavior occurs only in the presence or absence of certain people. Pain behaviors such as verbal report of pain, pain gesturing, and inhibition of routine activities often are associated with the presence of a spouse. In alcoholism, binge drinking is sometimes triggered by the absence of others. Itching skin rashes sometimes occur only in stressful social contexts.

Once the target response has been identified and defined, it is useful to ask the patient or another observer to keep a log noting the frequency and context, especially the social context, of the response and its consequences. The observer is usually asked to identify both the physical location and the people present each time the response is observed. These observations provide valuable information about stimuli that elicit or set the occasion for the response. What happens after the response is important for determining how the behavior is maintained and is central to the development of an effective treatment plan.

Baseline Measures

After the response has been identified and defined and its context determined, baseline measures need to be taken. The objective is to determine how often the response occurs before intervention begins. Establishing a baseline implies that enough observations are made so any trends can be identified. This is done so that continuation of a baseline trend will not be mistaken for a treatment effect. For example, if the

target behavior is cigarette smoking and the patient is already reducing consumption, the baseline produced might be as in Figure 3. Without the continuous baseline, frequency of smoking observed in C, a continuation of the trends in A and B, could be mistaken for a positive response to intervention. A baseline's duration depends on the time frame of the response and the physical and social consequences of the response. If the response occurs several times per day, 5–7 days is usually sufficient to discover a trend. But if the response occurs less than once per day, a longer baseline, perhaps 30 days or more, may be necessary. Certain target responses can require an even longer period. Psychophysiological reactions like skin disorders or asthmatic episodes may occur only one to three times per month.

After the response has been delineated, its context identified, and some baseline measures obtained, the clinician should be able to make some initial decisions concerning treatment. The clinician needs to determine (1) if the client has the target response in his repertoire, (2) if the client has the response in his repertoire, but it needs to be increased and maintained at higher levels, or (3) if the problem is a response that is occurring too frequently and therefore needs to be reduced or a response that is completely maladaptive and needs to be eliminated.

Identification of Sources of Reinforcement

Consequences (reinforcement) of the response that maintain it need to be identified (where the problem involves a response already in the patient's repertoire). Sources of reinforcement that can change the re-
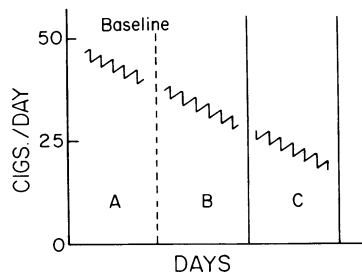

Figure 3. Baseline with a trend. Continuous recording allows for detection of response trends not due to treatment. If pre- (baseline) and posttreatment (B or C) assessment were made without continuous recording, it would be easy to infer that treatments were effective. Actually, response to treatment shows no deviation in the downward trend established before treatment began.

sponse also need to be determined. These can be identified by (a) asking the patient what he would like as a reinforcer, (b) carefully observing response preferences and frequencies, and (c) using daily activity logs. These logs can indicate activities that could be utilized contingently as reinforcers, employing the Premack principle (1965). Simply stated, this principle asserts that if one activity occurs more than another, it can be used contingently to increase the frequency of the other.

Identification of Adaptive and Incompatible Responses

Adaptive responses and skills provide the foundation on which intervention plans are built. Where the target response is one to be reduced or eliminated, as opposed to strengthened, adaptive responses already in the patient's repertoire need to be evaluated carefully. Those that are incompatible with the target response may prove valuable for the treatment plan.

One useful conceptualization during assessment is to classify current adaptive responses into two classes based on their relation to the target response: (1) concurrent behavior that occurs at the same time as the target response (i.e., talking and scratching or smoking and walking); (2) incompatible behavior that cannot occur with the target response (i.e., talking and listening to someone else talk or smoking and swimming). This conceptual scheme is most useful when the target response is maladaptive. But assessment of behavioral assets is useful for treatment planning no matter what the target response.

Manipulation of the Controlling Variable(s)

In operant conditioning assessment, introduction of the independent variable(s) often provides critical information on the target response. If the chosen independent (controlling) variable has no effect, the dependent variable (target response) will show no deviation from its normal variability. If it has powerful effects, the dependent measure will reflect it as a deviation from baseline. Figure 4 shows a hypothetical dependent variable along the ordinate and two independent variables A and B along the abscissa, only one of which is effective. It is clear that only variable B produces effects, and these are demonstrated when B is removed and then presented a second time.

The process of introducing an independent variable (treatment) and observing its effects on the target response (symptoms) is the modus operandi of an operant conditioning approach. When operating in a new area where the most effective treatment is unknown, several independent variables (treatments) can be given a trial and withdrawn to determine which is most effective. At the point where independent variables are manipulated, assessment and treatment are concurrent.

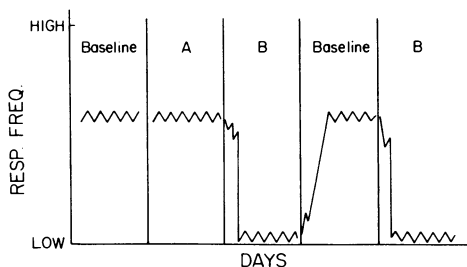There are many ways independent variables can be manipulated.

Figure 4. Manipulation of an independent variable. When variables A and B are manipulated by introducing and removing them, it is clear that only variable B is effective in reducing the response. The reestablishment of baseline and introduction of B a second time replicates the effect of B and increases the confidence in its effect.

Some manipulation strategies, such as the multiple-baseline design, lend themselves to application in clinical settings more than others. For example, the ABA design where a treatment is administered, withdrawn, and readministered is often difficult to accomplish if treatment has a positive effect. Usually, the clinician is the only one interested in establishing a cause–effect relationship. The ABA design is especially difficult to utilize where others, such as parents or hospital staff, administer treatment. In those cases, the multiple-baseline design or alternative strategies could be utilized. There are many control techniques that do not require withdrawal of an effective treatment once it is administered (see Hersen & Barlow, 1976).

Continuous Recording

Operant conditioning assessment involves observing an identified response(s) over time as treatments are introduced. Thus, assessment continues throughout the treatment process. In order to utilize this approach, continuous recording needs to be done. With continuous recording, efficacy of treatment can be evaluated as it is administered repeatedly for new responses in a multiple baseline or as it is administered and withdrawn.

OPERANT CONDITIONING TREATMENT

Basic Strategies

After a response is identified and a baseline established, intervention can begin. Establishing a baseline, assessment, and intervention then become concurrent processes. The first conditioning procedure utilized

depends on assessment findings. If assessment indicates that the target response is present but requires modification, a baseline needs to be established. However, where assessment shows that the best strategy is to condition a new response, baseline is not the first step or, by definition is considered to be zero. Procedures for modifying existing behaviors will be discussed first.

Manipulation of Independent Variable

Assessment shows what independent variables can be employed to modify the response. Typically, the strategy involves contingent use of some event that serves to reinforce the target response, its inhibition, or an incompatible response. The event must be controlled by the clinician or client according to a specified contingency. The contingency specifies conditions by which a reinforcing event occurs. For example, where exercising a partially paralyzed left side is the response, the clinician can make viewing television for 15 minutes contingent on a certain number of exercises being completed. At the end of 15 minutes, the television should be turned off until exercises are repeated. In this way, assessment observations showing what behavior occurs most frequently on a rehabilitation ward (television watching) would be used to determine the reinforcement event during conditioning.

Continuous Recording

Continuous recording of the target response and other critical events such as reinforcers, special stimuli, or circumstances is an integral part of both the assessment and the treatment strategies. In the example above, continuous recording would indicate whether the client was increasing exercises or not. A likely result might be that the client was increasing exercises but primarily during prime time, 7–9 P.M. Continuous recording of the times exercises were completed would allow detection of this pattern.

Contingency Reversal and Multiple Baseline

Sometimes it is important to know for sure that some specific component of treatment such as a contingency is effective. A contingency is often associated with several other nonspecific factors. Attention of doctors or nurses, demands of the situation, or even the data record have been shown to powerfully influence behavior. Where it is important to establish a causal relation between a specific treatment contingency and the target response, a reversal or other control procedure can be used.

Control procedures can involve (1) reversal of contingency for reinforcement, (2) a variant of reversal where reinforcement is used noncontingently, (3) multiple baselines with repeated introduction of the con-

tingency for new responses, or (4) other, more elaborate procedures (see Hersen & Barlow, 1976; Honig, 1966).

In contingency reversal, the contingency for reinforcement is changed to reinforce the opposite response tendency. In the multiple-baseline design, treatment is introduced sequentially across several responses, patients, or settings to evaluate the specificity or generality of the effects. It provides an alternative to withdrawing treatment or use of contingency reversal to establish a cause–effect relationship.

Treatment Procedures

The basic strategy outlined in the preceding section is employed using different contingencies, reinforcers, and methods for a variety of disorders. One way to classify these methodologies is by the effects they have on target behaviors. There are four objectives in altering behavior: (1) to initiate new responses; (2) to increase and/or maintain behavior already conditioned; (3) to reduce or eliminate behavior; and (4) to restrict a response to certain situations. Complete reviews of operant procedures can be found elsewhere (Ferster & Skinner, 1957; Honig, 1966; Honig & Staddon, 1977; Reese, 1978). The more common and well-proven methods will be reviewed here. It should be noted that though these methods are presented independently, in clinical practice two or more are often used concurrently.

Methods to Initiate New Behavior

When the patient's repertoire does not include a needed response, response initiation methods must be employed. Like other methods, they depend on systematic assessment to suggest what the target response should be, where it should and should not occur, and what events can serve as reinforcers.

Response initiation training is aided by high levels of patient motivation. Any methods that can enhance patient motivation in addition to using a strong reinforcer should also be employed. Such techniques can include verbal persuasion, sources of social reinforcement, and voluntary restriction of access to the reinforcer.

Shaping. The most frequently used method to condition a new response is shaping. In shaping, reinforcement is at first delivered contingent on an approximation of the target response. As the approximation increases in frequency, closer approximations to the target response are required (i.e., successive approximation). This continues until the terminal response becomes the contingency.

Spasmodic torticollis has been successfully treated using shaping to reinforce increasingly normal head positions. Brierly (1967) constructed a special headgear that administered a mild electric shock to the wrist when head position was abnormal. The appartus was adjusted such that patients were gradually shaped to increasingly normal head positions. A

more recent study (Brudny, Grynbaum, & Korein, 1974) suggests that simultaneous shaping utilizing biofeedback to decrease activity in the spasmodic muscle while simultaneously increasing contractions and strength in the contralateral muscle may be the most promising technique.

Modeling. When certain behaviors are demonstrated, they allow for modeling of the response and learning by imitation. This is often more efficient than shaping. The procedure involves someone modeling the target response and then having the patient imitate the model. Feedback on the imitated response should be given immediately. Reinforcement can also be delivered after the imitated response. Modeling and imitation can be repeated several times, each time with immediate feedback and reinforcements if needed. With motivated clients, feedback itself usually serves as a reinforcer, so additional reinforcement is not needed. Reinforcement or positive feedback is withheld until closer and closer approximations of the modeled response are produced. Thus, modeling actually involves the process of shaping.

The author often uses deep muscle relaxation training to help patients with high anxiety levels and excessive muscle tension. Modeling the relaxation response for patients facilitates acquisition of this response. Repeated modeling of relaxation exercises is used as well as modeling the terminal relaxation response. Immediate feedback through verbal praise and descriptions of tense areas is used. The most effective feedback probably comes from touching tense areas so patients can identify exactly where they are tense. This touch feedback facilitates proprioceptive discrimination of relaxed versus tense muscle groups.

Methods to Increase or Maintain Behavior

Often the clinician has to increase a response that has already been acquired. A similar problem is maintaining responses at certain desirable levels. Both of these problems involve methods applicable for responses the patient has already acquired. Procedures used for increasing or maintaining behavior can be divided into three classes: (a) those employing positive reinforcement; (b) those employing negative reinforcement; and (c) those utilizing strategic environmental change without manipulating reinforcement directly.

Procedures Employing Positive Reinforcement. Reinforcement is the process of strengthening behavior. Such strengthening occurs when a stimulus is made contingent on a response and, thereby, that response becomes more likely given similar circumstances in the future. The stimuli that alter response strengths are called *reinforcers* and are classified as positive or negative. A positive reinforcer is one that strengthens behavior by its presentation. An organism responds in order to produce it. A negative reinforcer is a stimulus that strengthens behavior by its contingent removal. An organism responds in order to reduce or remove it.

Complete reviews of these procedures can be found elsewhere (Ferster & Skinner, 1959; Honig, 1966; Honig & Staddon, 1977). However, there are a few well-tried methods of positive reinforcement used in most clinical settings that warrant brief discussion: reward conditioning, self-recording, and modeling.

Reward Conditioning.   This is a basic paradigm where positive reinforcement is employed. Very simply, reinforcement (reward) is introduced contingent on increases in the number or rate of a response. The magnitude of the resulting increase depends on the contingency, topography of the response, physical limits to responding, and nature of the reinforcer used.

Welgan (1974) used a reward-conditioning procedure that reinforced ulcer patients for increases in the pH of gastric acid secretions. They showed significant increases in pH of gastric acid secretion while concentration and volume of secretions significantly declined. When feedback reinforcement was withheld, no significant changes appeared. This preliminary work suggests that gastric acid secretion may be altered and controlled by reward conditioning utilizing biofeedback. This study is a good example of how operant conditioning procedures might be extended to treat medical disorders.

Self-Recording.   In this standard operant procedure for modifying or maintaining behavior, the individual observes and records his or her own behavior in lieu of a machine or another observer. Perhaps because of the reinforcing effects of self-awareness and control, many people are able to change or maintain target responses with self-recording as the main intervention. In the author's experience, self-recording works best with well-motivated patients. Where motivation is weaker, additional contingencies and reinforcers usually have to be introduced.

Self-recording that involves monitoring of biological responses has been called biofeedback. Though given different labels, both of these procedures are variations on the basic reward-conditioning paradigm, with information serving as the contingent event for reinforcement.

In weight control treatment programs patients are often asked to self-record certain physical activities requiring considerable expenditure of energy. During baseline some will begin to increase physical activity significantly. A similar effect is noted when consumption of targeted foods is recorded.

Modeling.   Even where a patient already has a response in his or her repertoire, modeling can be an effective way to increase that response. A patient having difficulty complying with a medically prescribed regimen of exercises will often increase compliance when they are modeled. Such modeling can be done by an individual or a group. Effectiveness of modeling can be enhanced by reinforcing patient behavior that meets the performance criterion. Though a reasonable imitation of a modeled response is often sufficient to reinforce and maintain responding, additional reinforcement, such as the physician's or nurse's attention and praise, will often increase effectiveness of modeling.

Modeling plus external reinforcement can be a useful tool where patients must acquire some skill in testing or treating themselves. Clinicians or nurses can model how to perform the test on themselves, and then, when criterion performance is obtained, socially reinforce the patients. This is a valuable procedure for teaching diabetics how to test their urine and how to prepare and administer insulin injections.

Procedures Employing Negative Reinforcement

Escape Conditioning. In escape conditioning, some aversive stimulus is introduced to a situation where the target response occurs or should occur. Removal or reduction of that aversive stimulus is then made contingent on the target response. Compliance to medication regimens has been improved using escape conditioning. Azrin and Powell (1968) designed a pocket-sized pill container and timer to increase compliance to a temporal schedule of medication. When 30 minutes had elapsed since the last pill was taken, a 50 db tone sounded that could only be terminated by turning a knob; turning the knob ejected a pill and reset the timer. Ejecting the pill is an example of *response priming,* another technique used to increase or maintain behavior already in the repertoire of the patient. The combination of escape conditioning and response priming produced 97% compliance to the medication schedule.

Avoidance Conditioning. Escape contingencies are often used concurrently with avoidance procedures. In avoidance conditioning, occurrence of an aversive stimulus is omitted (is avoided) contingent on some response. Typically, an escape contingency is used during initial avoidance conditioning. The aversive stimulus is introduced on some schedule, say once every 2 minutes, and continues until a response is made, when it is terminated (escape). The aversive stimulus might be continued only for some set period if the patient does not respond, say 5 seconds, or it may be continued until a response occurs. An avoidance contingency is also utilized during this phase so that if the patient makes a response before the aversive stimulus is presented, it will be omitted (avoidance). During initial conditioning, most patients learn to escape first and subsequently to avoid. In some situations use of the escape–avoidance training procedure seems to facilitate initial increase of the avoidance behavior. It is possible to condition avoidance without first utilizing an escape contingency, but acquisition of the response is usually retarded when this is done.

Escape–Avoidance Conditioning. A combination of escape and avoidance conditioning was used by Lang and Melamed (1969) to treat severe ruminative vomiting in the 9-month-old infant referred to earlier. Assessment showed the most reliable precursors of vomiting to be sucking movements and reverse peristalsis, measured by EMG. At onset of reverse peristalsis, the aversive stimulus, a painful electric shock, was applied to the calf of the leg. Since onset of shock was contingent on reverse peristalsis, this operation meets the defining conditions for

punishment conditioning. Pulsed shock continued until vomiting termi-
nated. Thus, when vomiting terminated the infant escaped shock. After a
few escape trials the investigators noted avoidance behavior. The infant
would begin sucking his hands and thumb, then remove them before
reverse peristalsis and vomiting began, thus avoiding the shock. When
inhibition of vomiting occurred, the avoidance conditioning and terminal
treatment phase began. This inhibition was the final target response and
treatment objective. Inhibition of vomiting was acquired rapidly, and by
the third day most vomiting was eliminated. But on the fifth day more
vomiting was observed and escape conditioning was resumed. Following
this, no more vomiting occurred. The conditioning procedure was termi-
nated after 8 days, with days 6–8 constituting the avoidance-conditioning
sessions. The infant was discharged after 13 days, during which he in-
creased his body weight from 13 to 16 pounds (23%). Follow-up at one
month showed his weight to be 21 pounds, and at 5 months, 26 pounds.
One year after treatment, the child continued to thrive without vomiting.

   Procedures Utilizing Strategic Environmental Change.   All treat-
ment strategies involve some environmental change. However, certain
environmental changes can produce significant reductions in symptoms
via relatively simple strategic changes in the environment. Conceptualiz-
ing these procedures as *independent* may remind us to look for simple
changes first.

   Sometimes, altering the environment in a strategic way can either
increase or decrease a target response. For example, compliance to a reg-
imen where medication should be taken at mealtime can be increased by
changing the eating environment. An attractive pill box could be placed
at the center of the dining table. Each time the patient sat down to a meal
at the table, the pill box would be a reminder to take the medication.

   Behavioral risk factors for heart disease, smoking, and obesity can be
modified by strategic environmental changes. Removal of ash trays and
cigarette containers from the living environment can reduce smoking
behavior and exposure to smoke in that environment. Strategic place-
ment of no-smoking signs can also reduce smoking in those areas. Obes-
ity can be attenuated by environmental changes that are usually best
applied as one aspect of a comprehensive behavioral management pro-
gram. Strategic environmental changes might include placement of a
daily weight graph on the refrigerator door. The eating environment can
be changed by removing all eating cues from the house except for the
dining area; candy and nut dishes, trays, and so forth, can be removed.
Another important change is elimination of all "junk food" and candy
from the house.

Methods to Reduce or Eliminate Behavior

   Self-Recording.   Use of self-recording is often sufficient to produce a
significant reduction in problem behavior with a motivated patient. The

mechanism of action might be mild punishment combined with positive reinforcement. If the behavior is seen by the patient as a problem, an annoyance, or aversive in any way, then recording its occurrence would also be expected to be mildly aversive. Self-recording of each response then becomes a punishment paradigm. When the recording indicates decreases in the behavior, recognition of progress and positive self-statements may be positively reinforcing.

In addition to client motivation, the response selected for self-monitoring is critical. Those responses that have a crucial (causative) role in the target symptom, rather than those that simply reflect the effects of causative variables, are most likely to produce change. Romanczyk (1974), in a study with obese patients, found that monitoring daily weight did not interact with the causation variables maintaining overeating and that no weight loss occurred. However, self-monitoring of daily calorie intake in the absence of therapist contact was as effective in producing weight loss as either of the full-treatment groups.

Punishment. This procedure uses an aversive stimulus that is made contingent on the target response. In clinical settings it usually is used in conjunction with an escape–avoidance procedure. The aversive stimulus is delivered contingent on the target response. Inhibition of the target response then produces escape from the punishing stimulus. Sometimes, inhibition of the target response is produced by escape conditioning of an incompatible response. When the target response is inhibited and/or the incompatible response occurs instead of the target response, the patient avoids the aversive stimulus, and avoidance conditioning occurs. In this situation target response inhibition or the occurrence of an incompatible response is negatively reinforced by avoidance of the aversive stimulus. Once avoidance conditioning is well established, the aversive stimulus can often be inactivated, and the incompatible response will be maintained (Bachman, 1972).

Good treatment practice and ethical concerns suggest that punishment procedures should only be used when less restrictive measures have been shown ineffective. However, especially where responses are life threatening or self-injurious, punishment procedures can be quite effective in markedly reducing or eliminating them. Many investigators have shown that a variety of self-injurious behaviors in hospitalized psychotic and mentally retarded children can be effectively suppressed or eliminated by use of punishment procedures (Bucher & Lovaas, 1968; Corte, Wolf, & Locke, 1971; Lovaas & Simmon, 1969; Tate & Baroff, 1966). It is important to note that these studies also employed reward conditioning to reinforce behaviors that were incompatible with or that competed with self-injurious responses. Also, punishment was eliminated once the behavior was under control.

Response Cost and Time-Out. These are variations of the punishment procedure. In response cost, a positive reinforcer is removed contingent on a response. The classic example of this is a fine for a traffic

violation. With time-out, positive reinforcement is made inaccessible for a period contingent on the response. The behavioral effects of both of these procedures are similar to punishment. The traget response is reduced or eliminated. Effectiveness of any of these punishment procedures can be greatly enhanced by using them concurrently with reward conditioning. A behavior incompatible with the punished response is positively reinforced while the target response is being punished.

Elliott and Tighe (1968) used response cost as part of a treatment to reduce cigarette smoking. Any smoking caused the loss of a large advance deposit. Money was returned to subjects gradually as they increased periods of abstinence. After 16 weeks, 85% were abstinent, and 75% of those abstinent claimed that fear of losing their deposit sustained their abstinence. Small "fines" have also been effective. Siegel, Lenske, and Broen (1969) used a 1-cent fine to suppress speech disfluencies in college students.

Satiation. When an organism has a surfeit of reinforcers, the usual result is a reduction in the response. This lawful relationship can be occasionally used in treatment to reduce or eliminate responding, especially when the reinforcer is a consumable. However, the procedure works for nonconsumables as well (see Ayllon, 1963). A good example is rapid smoking, considered the most effective behavioral technique for eliminating cigarette smoking (Bernstein & McAlister, 1976). The procedure requires patients to puff and inhale every 6 seconds for 3-minute periods or until they cannot continue. After a brief rest period, patients are encouraged to endure at least a second and often a third trial. The procedure is aversive. It exacerbates the stressful effects of smoking on cardiovascular and respiratory systems. Some patients are therefore inappropriate for treatment, and all patients should be medically screened. The aversiveness stems from satiation with the reinforcer, cigarettes. The technique has proven effective for cessation of smoking in many studies. However, like other successful methods for smoking cessation, relapse remains high, and permanent cessation will probably necessitate the use of other methods to maintain abstinence (Lichtenstein & Danaher, 1976).

Massed Practice. This proceedure consists of a target response being repeatedly elicited and reinforced at rates considerably above normal. The term is unfortunate and is often confused with the verbal-memory procedure of massing memorization practice trials versus distributing them over time. Massed practice has also been called negative practice and paradoxical intention. Technically, in massed practice the response being repeatedly elicited is reinforced; otherwise, the procedure becomes extinction, which is itself a method for reducing or eliminating behavior. By whatever term it is called, massed practice has perhaps been underutilized for reducing or eliminating behavior.

An example of the use of this procedure is found in the case of a 9-year-old boy with severe facial tics treated by the author (Milby, 1979). The patient had a forced blinking of both eyes as the most prevalent stereotyped

movement. This interfered with his reading ability and, thus, with his schoolwork. He had two other tics that occurred at lower rates. The tics were reduced by Valium, but it had to be discontinued because a dose high enough to reduce the tics also induced sleep. This interfered with schoolwork more than the tics. After gathering baseline data for a week, the author used 3 days of reinforced massed-practice trials. Reinforcement in the form of toy trucks and consumables was made contingent on increasing tics to greater than 100% of their baseline levels. Immediately following this massed practice, reinforcement contingencies were reversed. The patient was reinforced for longer and longer periods without tics until no tics were observed for a week at a time. Treatment was terminated after 8 weeks. Follow-up at 6 months, 2½, 6, and 9 years showed tic frequencies to be at zero or very low levels.

Reinforcement of Incompatible Behavior. In the example of massed-practice treatment, reinforcement of incompatible behavior was also employed. This procedure is commonly used in conjunction with other methods. During assessment, behaviors more adaptive than the target response and incompatible with it are delineated. These are made contingent on reinforcement in the situation where the usual maladaptive response occurs. Inhibition of the target response can always be conceptualized as the incompatible response. However, it may be more effective to utilize a behavior involving both inhibition of the target response and performance of incompatible behavior.

This technique is illustrated in the treatment of a case of severe, self-induced dermatitis (factitia dermatitis). Allen and Harris (1966) treated a child whose face and other body areas were excoriated from constant scratching for almost a year. The child's mother was instructed to give approval and attention for appropriate behavior like reading, playing or helping in housework and also to give approval and token reinforcement for every 20–30 minutes that no scratching was observed. Tokens were gold stars posted in a booklet and redeemable for food and trinkets. Later, Barbie doll clothes were used as reinforcers to control nocturnal scratching. If the child refrained from scratching during the whole day, she and her mother went shopping for a Barbie doll item, which was placed in her bedroom at night. If there was no sign of scratching during the night, she could keep the item in the morning. By the sixth session with the mother, the skin was almost healed, and the mother was directed to gradually increase the ratio of reinforcement. The number of stars needed for a Barbie doll item was slowly increased until a doll item was given less than once per week. After 6 weeks of reinforcing incompatible behavior, the sores had completely healed. A 4-month follow-up showed continued control of scratching, and scars were fading and almost undetectable.

Omission Training.   This procedure is similar to reinforcement of incompatible behavior. The incompatible behavior is omitting the target behavior. Reinforcement is delivered contingent on the nonoccurrence of

the response. Any other behavior can develop to fill the behavioral void when the target response is omitted; no specific alternative behavior is targeted for reinforcement.

Some seizure disorders have been shown to be responsive to operant conditioning approaches (Efron, 1957a, 1957b; Gardner, 1967). Zlutnick, Mayville, and Moffat (1975) used omission training with a 17-year-old girl diagnosed as mentally retarded with major motor epilepsy. She had a life-long history of seizures with multiple seizures daily despite large doses of Dilantin and phenobarbital. Baseline showed about 16 seizures per day, consisting of the following sequence: (1) her body became tense and rigid, (2) she clenched her fists and raised her arms at a 90-degree angle, (3) her head snapped back, and a grimace appeared on her face, and (4) the major motor seizure ensued. Preseizure behavior of arm raising occurred on 100% of the seizures. Treatment involved having staff lower her arms as soon as the second phase in the sequence occurred. If she kept her hands down for 5 seconds, she recieved lavish praise and an M & M candy. The procedure was immediately effective. Seizures occurred only when staff members were unable to reach her in time to lower her arms before her head snapped back. Reversal of contingencies (return to baseline conditions) and reintroduction of omission training was used to confirm that training was responsible for the reduction in seizures.

Another term used for omission training in operant conditioning approaches is *differential reinforcement of other behavior* (DRO) schedule. With this schedule, reinforcement is made contingent on the occurrence of some unspecified behavior other than the target behavior. It reduces to the same procedure as omission training.

DRL Schedules of Reinforcement. Differential reinforcement of low rates (DRL) of behavior is a procedure for reducing or eliminating behavior similar to DRO. Here, reinforcement is made contingent on some specified number of responses or less per unit time. Thus, the contingency is some low rate of responding that must be met or exceeded before reinforcement is delivered. This is a particularly appropriate procedure when the clinician wishes not to eliminate the behavior entirely but rather to reduce it to some minimal rate. Progressively decreasing responses per specified interval was used by Milby (1979) after massed practice for eliminating severe facial tics in the case described previously. Once the DRL contingency specified zero responses, it became a DRO schedule.

Extinction. With extinction, the identified reinforcer for a target behavior is eliminated. Where reinforcement involves attention or other forms of social interaction, this procedure can be very difficult to utilize. The problem is that the clinician rarely can control the reinforcing social interaction with others. Even if most such social reinforcement is successfully eliminated, an occasional social reinforcer by mistake can be enough to maintain target behavior.

The time, effort, and persistence required to extinguish a behavior

depends on many factors: history and schedule of reinforcement, duration of the behavior, motivation deprivation or reinforcement at time of extinction, and availability of and reinforcement for a behavior incompatible with the target behavior. Extinction usually does not produce a rapid decline in target behavior, but it is capable of permanently eliminating it. Commonly, target behavior increases immediately after the procedure is introduced. Though this is temporary, it can be disconcerting to the inexperienced. All other factors held constant, behavior maintained on a partial-reinforcement schedule (typical in natural environments) is more resistant to extinction procedures. Behavior maintained on continuous reinforcement (reinforced at every occurrence) is easier to extinguish. During initial stages of extinction, there may be side effects, that is, behavioral effects of the procedure in addition to reduction of the target response. In addition to an initial increase in target response rate, there may be undesirable "emotional" behaviors like aggression (Kelly & Hake, 1970) and annoyance (Fuller & Reese, 1974).

Extinction of drug seeking and analgesic consumption has been obtained in chronic-pain patients (Fordyce, Fowler, Lehmann, DeLateur, Sand, & Trieschmann, 1973). The contingency for medication was changed from request contingent (prn) to time contingent. Medication was administered on a regular schedule whether requested or not and was delivered in a color- and taste-masking vehicle that disallowed visual detection of dose changes. Over a 7-week period doses were reduced and finally eliminated while at the same time numerous activities were increased.

It is hard to find many examples of the clinical use of extinction alone, especially in the area of medical psychology. The scarcity of published applications in clinical situations may reflect the difficulty in achieving the necessary reinforcement control in real-life situations. In the author's view the recommended strategy where extinction is being considered is to utilize extinction in combination with other approaches.

Removing Opportunity to Respond. Some target responses lend themselves to direct environmental change that makes the response inaccessible or unavailable. The essential element is removal of the opportunity to respond. Store owners who wish to eliminate shoplifting of valuable merchandise put it in a locked showcase. No special training or conditioning procedures are required here.

The procedure is illustrated in the treatment of onychophagia (nail biting). One effective treatment is to have the patient carry a nail clipper and file and instruct him or her to keep nails clipped close and filed smooth. Typical nail-biting behavior is elicited by two stimuli: (1) the presence of a long nail and (2) rough edges on nails. Thus, this treatment strategy employs removing the opportunity to respond. Where a certain problem behavior involves the use of some object or tool or the consumption of some object or food, removal of these items from the patient's environment is often the most efficient strategy for treatment.

Restraint and Confinement. These procedures are similar to removing the opportunity to respond but with response cost also involved since access to reinforcement is usually restricted. Where the objective is temporary cessation of a response, restraint can be very useful. Padded cuffs and jackets are sometimes necessary to control the self-destructive or physically aggressive behavior of mentally retarded or psychotic patients. These procedures are undesirable and overly restrictive for achievement of permanent control of such behavior, but they can be useful temporary solutions while other approaches reviewed here are being employed but have not yet accomplished the degree of change necessary to protect the individual or others.

Confinement is a very old behavior control measure that both reduces opportunity to respond and restricts reinforcement. Confinement can be a way of removing the opportunity to respond. This is illustrated by the hospitalization of patients to remove them from sources of stress, irritation, or disease. The same effect can often be achieved by prescribed vacations or "rest cures." These confine patients away from areas of contamination, irritation, stress, and so forth, and thus prevent the target symptom or response for a circumscribed period. A variant of confinement is the confinement of a particular body part to control potentially harmful movement. This is illustrated by the use of casts or braces, to prevent harmful motoric responses until areas are healed or to protect areas from further damage or strain.

Restricting Behavior to Certain Situations.

Sometimes, the best treatment strategy involves restricting behavior to certain situations. Restriction can be accomplished in several ways. One is by removing the opportunity to respond in targeted situations by directly changing the environment. Another way is through *stimulus control*. Operationally, this is accomplished by eliminating reinforcement for and/or administering aversive stimulation (punishment) for the response when it is emitted anywhere but in a designated area. At the same time, reinforcement is only available for the response emitted in the designated situation. Consistent application of this approach eventually brings behavior under stimulus control of the designated situation. Stimulus control can then usually be maintained with a modicum of occasional reinforcement and/or punishment.

This approach is illustrated in the multimethod behavioral-control approaches to obesity (Harris, 1969; Harris & Bruner, 1971; Stuart, 1967, 1971; Wollersheim, 1970). Usually, various self-administered nonconsumable reinforcing events are used. The obese patient restricts eating to a nonconcurrent behavior in a certain place, the dining room, only at meal times. By utilizing various self-reinforcers and support by family members, the obese patient learns to eliminate concurrent eating while, for example, watching television or driving. Similar procedures are em-

ployed to restrict eating to the dining area only. Thus, eating in other areas is extinguished. In addition, some programs emphasize temporal stimulus control so that three meals per day, each at a certain time, are utilized to exercise temporal stimulus control. Where the individual is too embarrassed to gorge around others, this social stimulus control is utilized—he or she eats only in the presence of others. The objective of these procedures is to bring all eating behavior under stimulus control of a certain place as a nonconcurrent behavior at a certain time. When the obese patient's eating is brought under such stimulus control, excessive food consumption is eliminated, and significant weight loss results.

Combining Strategies

Treatment strategies have been discussed as if each were applied independently. In actuality, this is usually not the case. Often patients have two or more problems each of which calls for different treatment strategies. The resulting treatment plan involves a combination of different procedures. For some complex problems like obesity and cigarette smoking, "packages" of several procedures are employed, each component designed to deal with a certain aspect.

Assessment and treatment strategies have been reviewed one-by-one for the sake of clarity. The risk in this is leaving the reader with a false sense of the simplicity of operant procedures. Like the treatment packages for obesity and smoking, individual treatment plans typically involve several treatment procedures used in combination. However, since assessment is ongoing, the relative impact of each component on its target response can usually be determined. Because assessment is ongoing, the clinician should always have a sense of the efficacy of the procedures. Thus, the treatment plan is usually dynamic in the sense that changes are periodically introduced based on the assessed efficacy and need. The end result is a continuous interplay between them, with each influencing the other.

REFERENCES

Allen, K. E., & Harris, F. R. Elimination of a child's excessive scratching by training the mother in reinforcement procedures. *Behavior Research and Therapy*, 1966, *4*, 79–84.

Ayllon, T. Intensive treatment of psychotic behavior by stimulus initiation and food reinforcement. *Behavior Research and Therapy*, 1963, *1*, 53–61.

Azrin, N. H., & Powell, J. Behavioral engineering: The reduction of smoking behavior by a conditioning apparatus and procedure. *Journal of Applied Behavior Analysis*, 1968, *1*, 193–200.

Azrin, N. H., & Powell, J. Behavioral engineering: The use of response priming to improve prescribed self-medication. *Journal of Applied Behavior Analysis*, 1969, *2*, 39–42.

Bachman, J. A. Self-injurious behavior: A behavioral analysis. *Journal of Abnormal Psychology*, 1972, *80*(3) 211–224.

Bernstein, D. A., & McAlister, A. The modification of smoking behavior: Progress and problems. *Addictive Behaviors*, 1976, *1*, 89–102.

Brener, J., & Hothersall, D. Heart rate control under conditions of augmented sensory feedback. *Psychophysiology*, 1966, *3*, 23.

Brierly, H. The treatment of hysterical spasmodic torticollis by behavior therapy. *Behavior Research and Therapy*, 1967, *5*, 139–142.

Brudny, J., Grynbaum, B. B., & Korein, J. Spasmodic torticollis: Treatment by feedback display of the EMG. *Archives of Physical Medicine and Rehabilitation*, 1974, *55*, 403–408.

Bucher, B., & Lovaas, O. Use of aversive stimulation in behavior modification. In M. Jones (Ed.), *Miami symposium on the prediction of behavior, 1967: Aversive stimulation*. Coral Cables, Fla.: University of Miami Press, 1968.

Corte, H. E., Wolf, M. M., & Locke, B. J. A comparison of procedures for eliminating self-injurious behavior of retarded adolescents. *Journal of Applied Behavior Analysis*, 1971, *4*, 201–213.

Efron, R. The effect of olfactory stimuli in arresting uncinate fits. *Brain*, 1957, *79*, 267–281. (a)

Efron, R. The conditioned inhibition of uncinate fits. *Brain*, 1957, *80*, 251–262. (b)

Elliott, R., & Tighe, T. Breaking the cigarette habit: Effects of a technique involving threatened loss of money. *Psychological Record*, 1968, *18*, 503–513.

Ferster, C. B., & Skinner, B. F. *Schedules of reinforcement*. New York: Appleton-Century-Crofts, 1957.

Fordyce, W. E., Fowler, R. S., Lehmann, J. F., DeLateur, B. J., Sand, P. L., & Trieschmann, R. B. Operant conditioning in the treatment of chronic pain. *Archives of Physical Medicine and Rehabilitation*, 1973, *54*, 399–408.

Fuller, E., & Reese, E. P. *A comparison of four procedures in suppressing human response rates during a five-component multiple schedule of reinforcement*. Paper presented at the annual meeting of the American Psychological Association, New Orleans, September 1974.

Gagne', R. M. *The conditions of learning*. New York: Holt, Rinehart & Winston, 1965.

Gardner, J. Behavior therapy treatment approach to a psychogenic seizure case. *Journal of Consulting Psychology*, 1967, *31*, 209–212.

Gilbert, T. F. Fundamental dimensional properties of the operant. *Psychological Review*, 1958, *65*, 272–282.

Harris, M. B. Self-directed program for weight control: A pilot study. *Journal of Abnormal Psychology*, 1969, *74*, 263–270.

Harris, M. B., & Bruner, C. G. A comparison of a self-control and a contract procedure for weight control. *Behavioral Research and Therapy*, 1971, *9*, 347–354.

Hersen, M., & Barlow, D. H. *Single case experimental designs*. New York: Pergamon, 1976.

Honig, W. K. *Operant behavior: Areas of research and application*. New York: Appleton-Century-Crofts, 1966.

Honig, W. K., & Staddon, J. E. R. *Handbook of operant behavior*. New York: Appleton-Century-Crofts, 1977.

Kelly, J. F., & Hake, D. F. An extinction—induced increase in an aggressive response with humans. *Journal of the Experimental Analysis of Behavior*, 1970, *14*, 153–164.

Kimble, G. A. *Hilgard and Marquis' conditioning and learning*. New York: Appleton-Century-Croft, 1961.

Kimmel, H. D. Instrumental conditioning of autonomically mediated behavior. *Psychological Bulletin*, 1967, *67*, 337.

Lang, P. J., & Melamed, B. G. Case report: Avoidance conditioning therapy of an infant with chronic ruminative vomiting. *Journal of Abnormal Psychology*, 1969, *74*, 1–8.

Lichtenstein, E., & Danaher, B. G. Modification of smoking behavior: A critical analysis of theory research and practice. In M. Hersen, R. M. Eisler, and P. M. Miller (Eds.), *Progress in behavior modification* (Vol. 3). New York: Academic Press, 1976.

Lovaas, O., & Simmons, J. Q. Manipulation of self-destruction in three retarded children. *Journal of Applied Behavior Analysis*, 1969, *2*, 143–157.

Milby, J. B. *Increase and elimination of severe facial tics by contingent incentives.* Paper presented at the Southeastern Psychological Association meeting, New Orleans, March 30, 1979.

Miller, N. E. Learning of visceral and glandular responses. *Science*, 1969, *163*, 434.

Miller, N. E., & Banuazizi, A. Instrumental learning by curarized rats of a specific visceral response, intestinal or cardiac. *Journal of Comparative Physiological Psychology*, 1968, *65*, 1.

Miller, N. E., & DiCara, L. V. Instrumental learning of urine formation by rats: Changes in renal blood flow. *American Journal of Physiology*, 1968, *215*, 677.

Olds, J. The central nervous system and the reinforcement of behavior. *American Psychologist*, 1969, *24*, 114–132.

Premack, D. Reinforcement theory. In D. Levine (Ed.), *Nebraska Symposium on Motivation*, Vol. XIII, Lincoln: University of Nebraska Press, 1965.

Reese, E. P. *Human behavior: Analysis and application* (2nd ed.). Dubuque, Iowa: Wm C Brown, 1978.

Romanczyk, R. G. Self-monitoring in the treatment of obesity: Parameters of reactivity. *Behavior Therapy*, 1974, *5*, 531–540.

Siegel, G. M., Lenske, J., & Broen, P. Suppression of normal speech disfluencies through response cost. *Journal of Applied Behavior Analysis*, 1969, *2*, 265–276.

Skinner, B. F. *The behavior of organisms.* New York: Appleton-Century, 1938.

Skinner, B. F. *Science and human behavior.* New York: Macmillan, 1953.

Stuart, R. B. Behavioral control over eating. *Behavior Research and Therapy*, 1967, *5*, 357–365.

Stuart, R. B. A three-dimensional program for the treatment of obesity. *Behavior Research and Therapy*, 1971, *9*, 177–186.

Tate, B. G., & Baroff, G. S. Aversive control of self-injurious behavior in a psychotic boy. *Behavior Research and Therapy*, 1966, *4*, 281–287.

Thorndike, E. L. Animal intelligence: An experimental study of the associative processes in animals. *Psychological Review* (Monograph Supplement), 1898, *2*(8).

Trowill, J. A. Instrumental conditioning of the heart rate in the curarized rat. *Journal of Comparative Physiological Psychology*, 1967, *63*, 7.

Welgan, P. R. Learned control of gastric acid secretions in ulcer patients. *Psychosomatic Medicine*, 1974, *36*, 411–419.

Wollersheim, J. P. Effectiveness of group therapy based upon learning principles in the treatment of overweight women. *Journal of Abnormal Psychology*, 1970, *76*, 462–474.

Woods, P. J. A taxonomy of instrumental conditioning. *American Psychologist*, 1974, *29*, 584–597.

Zlutnick, S., Mayville, W. J., & Moffat, S. Modification of seizure disorders: The interruption of behavior chains. *Journal of Applied Behavior Analysis*, 1975, *8*, 1–12.

CHAPTER 3

Cognitive Learning Approaches
Applications in Health Care

DENNIS C. TURK

> So neither ought you to attempt to cure the body without the Soul, and
> this ... is the reason why the cure of many diseases is unknown to the physi-
> cians of Hellas, because they are ignorant of the whole which ought to be
> studied also, for part can never be well unless the whole is well.
> *Plato* (Cited in Schofield, 1902, p. 19)

OVERVIEW

In a more recent rephrasing of the above view espoused by Plato, Stern-
bach has said, "all functioning and all disease are both mental and
physical, because both mental and physiological processes are going on
continuously" (1966, p. 139). Yet, modern medical training and practice
continue to view the human organism as composed of physiological seg-
ments, anatomical parts, and isolated components, while neglecting the
total organization (Jonas, 1978; Reiser, 1978). In short, medical prac-
titioners often fail to heed the admonition of Plato.

Study of the contributions of individuals' attitudes, expectancies,
and beliefs (i.e., cognitive factors) have been mostly confined to the medi-

---

DENNIS C. TURK • Department of Psychology, Yale University, Box 11A Yale Station,
New Haven, Connecticut 06520.

cal subspecialty of psychosomatic medicine. Until recently, little atten-
tion had been afforded to the important contributions of cognitive factors
to all stages of the health–illness continuum. Some of the areas in which
cognitive factors have been implicated are the following:

1. *Maintenance of health* is primarily the responsibility of the indi-
vidual. Proper diet, exercise, self-monitoring, self-examination, and ar-
ranging for medical and dental checkups, have important roles in health
maintenance. Until recent times, however, the medical profession has
paid little attention to primary prevention. The media have encouraged
individuals to treat symptoms, not causes. Relief from insomnia, pain,
stress, indigestion, and so on, is sought from a bottle of pills, and little
attention is paid to the causes of these forms of distress. Medical prac-
titioners have also tended to address symptoms rather than causes, with
minor tranquilizers (i.e., Valium and Librium) being the most frequently
provided prescriptions (Jonas, 1978). It is no wonder that, as Dubos (1961)
has suggested, "men as a rule find it easier to depend on healers [palliative
medications] then to attempt the more difficult task of living wisely" (p.
130). Abrogation of the responsibility for maintenance of health may be
related to the individual's conceptions of health and illness and, more
generally, to beliefs related to the ability to control various aspects of life.
These conceptions are shaped, in part, by information conveyed by the
media and professionals, neither of which has encouraged individuals to
utilize their own resources and to assume their own health maintenance.

2. The *appraisal of physiological symptoms* and the decision of how
to respond are influenced not so much by the symptoms *per se* as by the
interpretation of those symptoms (Meichenbaum, 1977; Rodin, 1978).
The same symptom can be perceived and appraised differently by dif-
ferent individuals. It is the resulting judgment that will influence the
course of action. For example, Katz, Weiner, Gallagher, and Hellman
(1970) observed that the most common ways women coped with the
threat of cancer, having discovered breast lumps, were avoidance and
denial leading to delays in seeking medical examinations. Such delays,
when they are excessive, can result in metastasis and a much poorer
medical outlook if the growth is malignant. A second example of the
significance of symptom appraisal is offered by Gentry (1975). He has
estimated that as many as 70% of individuals suffering from myocardial
infarction misinterpret or deny the source of their symptoms. This be-
havior can result in disastrous consequences.

3. For some time it has been observed that *psychological stimuli* are
capable of eliciting *physiological changes* (Miller, 1935; Sternbach, 1964)
and that these physiological changes can mimic or reproduce pathological
responses associated with specific diseases (e.g., gastric hyperactivity and
hypermotility, tachycardia, hypertension, muscle tension; see Grace,
Wolf, & Wolff, 1951; Wolf & Goodell, 1968). Psychological appraisals are
believed to be the bases for such stress-related diseases as migraine

headaches, peptic ulcers, ulcerative colitis, asthma, and neurodermatitis. The potency of cognitive factors has been illustrated numerous times (Beecher, 1955; MacKay, 1974). For example, Dekker and Groen (1956) have demonstrated that visualization of situations that had in the past precipitated asthmatic attacks was capable of producing full-blown attacks in some individuals. Barber and Hahn (1962) have been able to produce subjective levels of discomfort and physiological responses similar to those produced by actual pain stimulation by having subjects visually imagine painful situations.

4. The importance of cognitive factors has been demonstrated in *recovery* from surgery as well as *adaptation* to chronic illnesses. Reviews by Pranulis (1975) and Klein (1975) indicate that the way patients cope with hospitalization and coronary care can influence the chances of survival. Turk (1979) has described the important influence of patients' attitudes and beliefs on adaptation to all forms of chronic illnesses. Klein, Dean, and Willson (1965) found that, among a sample of myocardial-infarction patients, the subjective meaning of the heart attack was an important determinant of the degree of disability.

5. An important feature of health care relates to *compliance with medical regimens.* Marston (1970) estimated that noncompliance with medication regimens ranges from 4 to 92%. After a review of the general medical literature, Davis (1966) estimated that approximately 30–35% of patients fail to follow their physicians' recommendations. Attitudes regarding symptoms, susceptibility to illness, physicians, and perceived efficacy of treatments have all been thought to be related to failures to adhere to medical recommendations (Maiman, Becker, Kirscht, Haefner, & Drachman, 1977).

In short, how a person experiences health, symptoms, and illness, what they mean to him or her, and how these meanings influence behavior are all integral components of health and disease when viewed as a total human response. Despite the burgeoning literature in this area, many health care providers fail to attend to the patient's cognitive appraisals and beliefs as these interact with all aspects of health and illness. It is not being suggested that cognitive factors determine every disease but rather that, no matter what the disease or level of health, individuals are constantly appraising their internal and external environments and that these appraisals will influence all aspects of health and illness.

The purpose of the present chapter is to examine the utility of cognitive learning approaches in a variety of health care situations. Although it will attempt to be comprehensive, it will not be exhaustive. Rather, illustrations of various techniques as they apply to selected aspects of health care will be provided with suggestions for the utility of such procedures in other circumstances and conditions. For illustrative purposes, this chapter will specifically focus on cognitive learning approaches with patients undergoing aversive medical procedures (e.g., diagnostic exam-

inations, surgery), manifesting stress-related disorders (migraine and tension headaches, peptic ulcers), and patients suffering from chronic conditions (chronic pain or illness).

In order to cover these topics coherently, the next section will describe the important contribution of cognitive factors to all aspects of behavior. The next section will describe a rationale and description of cognitive learning approaches as they have been employed to alleviate anxiety-based dysfunctions such as phobias and social and evaluation anxieties. The following section will discuss the application of the cognitive learning approaches in specific health care situations. The final section will discuss the implications of cognitive learning approaches to various areas along the health–illness continuum.

COGNITION AND BEHAVIOR

Cognition is a broad term that refers to both the content of thought and the processes involved in thinking. Ways of perceiving and processing material, the mechanisms and content of memory and recall, and problem-solving attitudes and strategies are all aspects of cognition.

Individuals are not passive responders to impinging stimuli. Through past experiences, observations, behaviors, and other sources of information, individuals note and extract the regularities of events in their environments. It is important to keep in mind that there is a constant interplay between the environmental context, cognitions, and behaviors that determine the unique quality of the individual's experience and subsequent course of action. This interplay has been labeled *reciprocity of causation* (Lazarus & Launier, 1978) or *reciprocal determinism* (Bandura, 1977). That is, individuals not only respond to information but also act on their environments. In this manner, behavior is fed back to individuals, providing new information that must be appraised. From these bits of information and regularities, individuals construct sets of implicit and explicit conceptions of themselves and their worlds. Such conceptions are composed of beliefs, values, commitments, and skills. The information of experience is actively and selectively filtered, transformed, and categorized by individuals based on the conceptions held. New information can be treated in several ways: it can be ignored, it can be assimilated into existing belief systems, or the conceptions may be modified to accommodate the information. Thus, the conceptions held are fluid rather than static, evolving as new information is encountered.

To become a source of distress, an event, whether internal or external, must be evaluated as potentially harmful rather than as benign or irrelevant (Lazarus & Launier, 1978). In this manner the individual imposes meaning onto his or her predicament. The appraisal of the event, the individual's internal dialogue regarding the situation, the attitudes and expectancies held concerning the situation, and the capacity to re-

spond more or less effectively to the situation determine the nature of behavioral and affective responses (Lazarus, 1974; Meichenbaum, 1977). Thus, by means of cognitive processes, the event is interpreted, meaning is ascribed, significance is established, and response is determined. The manner and degree of success in responding to the event will lead to reappraisal both of the event and of the individual's competencies, and, subsequently, existing conceptions will be supported or modified. Much of the diversity in responding to threatening events is probably related to variations in appraisals of the events and the existing conceptions held by the individual.

Certain information is needed to appraise accurately; yet, in most human affairs, especially those involving threats, unclear or insufficient information is a common occurrence. When information is ambiguous or insufficient, it is more difficult to evaluate what the likely outcomes are and how they can best be dealt with. As noted by Lazarus (1966), "the more ambiguous are the stimuli cues, the more important are general belief systems in determining the appraisal process" (p. 134).

This point may be particularly important in health and illness because many physiological symptoms are ambiguous and thus are likely to be interpreted as functions of currently held conceptions (Janis & Rodin, 1979). The conceptions held are likely to introduce biases and distortions. The same physical symptom may be viewed as trivial, a sign of weakness, or a basis for escaping an intolerable life task. Such interpretations will influence subsequent responding; for example, they might influence the perceived seriousness of the symptom, the decision to make medical contact, or adherence to a medical or health maintenance regimen. To illustrate this point, consider the observation of Hackett and Cassem (1975) that some men, during symptoms of heart attack, did vigorous pushups or ran up and down flights of stairs reasoning that they could not be having a heart attack because the exercise did not kill them!

The importance of cognitive factors is being emphasized because they have been largely ignored in medical practice. Patients have been treated as passive recipients of medical advice with little attention devoted to how such advice is interpreted. What does the symptom mean to the individual? How is the decision arrived at to seek attention? Why does the patient fail to adhere to medical regimens or ignore health maintenance messages? These are some of the critical concerns in medical practice, and each is related to conceptions and belief systems held by different individuals.

COGNITIVE LEARNING THERAPIES

Cognitive learning therapies (also known as cognitive behavior modification) are a loose aggregate of procedures that share a few fundamental assumptions. First, human behavior and affect patterns, whether

adaptive or maladaptive, are influenced by individuals' conceptions of reality (belief systems, appraisals, attributions) rather than by reality itself. Second, cognitive processes are shaped by procedures based in human learning (e.g., reinforcement, feedback, rehearsal). Finally, the task of the change agent is that of a "diagnostic evaluator" who assesses cognitive processes and arranges learning experiences that will reinforce adaptive and extinguish maladaptive cognitions (Mahoney & Arnkoff, 1978).

The cognitive learning approaches can be contrasted with other behavioral approaches that emphasize the direct treatment of specific symptoms. Behavioral approaches are often geared toward actions taken by the individual to avoid, escape, attack, or overcome the situational event and subsequent arousal. Most behavioral approaches are unconcerned about what the individual thinks or what his or her attitudes are regarding the symptoms. In short, the client's cognitions are irrelevant to successful intervention. Cognitive learning approaches, however, are designed to induce changes in perception, attitudes, and sense of control or helplessness about emotional states and behavior and, thereby, presenting problems.

The cognitive learning therapies can be grouped, for the purpose of discussion, into four categories: (1) cognitive restructuring, (2) coping-skills training, (3) problem-solving training, and (4) self-regulation training. Although these will be discussed separately, in fact they are closely related and, indeed, employ many of the same techniques. More extended discussions of the evolution and refinement of these approaches are provided by Mahoney (1974), Mahoney and Arnkoff (1978), and Meichenbaum (1977).

Cognitive Restructuring

One cognitive learning approach is cognitive restructuring (Beck, 1970, 1976; Ellis, 1962; Meichenbaum, 1975a,b; Meichenbaum & Cameron, 1974). The unifying theme of the cognitive restructuring approaches is that they all conceptualize maladaptive behavior as resulting from dysfunctional thinking (cognitive distortions, irrational beliefs, maladaptive internal dialogues). From this perspective it is the erroneous, and maladaptive, cognitions that account for selective attention, inaccurate anticipation of consequences, faulty expectations, and anxiety-engendering errors that influence affective experience and behavior. Because of the habitual nature of one's beliefs, it is likely that such thinking processes and images become automatic and seemingly involuntary, like other overlearned acts such as driving a car or walking.

Therapists holding a cognitive restructuring orientation differ in their techniques and styles of intervention but attempt to alter and correct maladaptive thinking that is assumed to be a precursor of excessive emotional arousal and maladaptive behavior. Adherents of this approach

attempt to bring about change by (a) discovering maladaptive thinking, (b) encouraging recognition of the deleterious impact of such thinking, (c) supplanting the maladaptive thinking with appropriate thought patterns, and (d) training the individual to use either situational or internal cues to generate self-control behaviors that can be applied in specific and general situations. The specific content of the cognitive restructuring can be formulated to help the client (a) approach problems systematically, (b) attend to critical cues in the environment or (c) his or her own thinking and behavior, and (d) carry out a behavioral response of proven effectiveness.

Coping-Skills Training

The distinguishing feature of the coping-skills training approach is the emphasis on helping the client to develop a repertoire of coping skills that will facilitate adaptation in a variety of threatening situations (Goldfried, 1971; Meichenbaum, 1975a; Sipperelle, 1967; Suinn & Richardson, 1971).

Bandura (1969) emphasized that the acquisition of coping skills is probably a complex, centrally mediated process involving direct, vicarious, and self-stimulating experience. Therapists employing the coping-skills training approach first attempt to delineate the presence or absence of adaptive coping skills in the individual's repertoire. Response deficiencies can be the result of physiological limitations, insufficient learning, poor retention, failure to integrate component skills, or inappropriate response utilization. Once the cause, or causes, of a coping-skills deficiency is identified, the therapist trains the client to employ the appropriate skills. The training might include didactic instruction, modeling of the appropriate behavior by the therapist, role-playing, and behavioral or cognitive rehearsal of the appropriate skills. Rather than focusing on discrete, situation-specific responses and problem-specific procedures, emphasis is placed on more general coping skills that can be applied across situations and problems. The nature of the skills included in the training will depend to some extent on the types of difficulties and problems the patients is likely to encounter. The skills might include such behavioral coping techniques as relaxation and deep breathing to reduce emotional arousal and such cognitive stratagies as imagery and selective attention to enable either tolerance of unpleasant situations that are unavoidable (e.g., taking examinations, controlling impulses) or reappraisal of certain aspects of the stressful situation.

Problem-Solving Training

Problem-solving training involves teaching the individual to proceed through various stages of thinking to arrive at a solution to a problem. The essential stages include formulation of the problem, organization of a

plan, and testing the plan's utility. The problem-solving procedure can be applied either directly to the problem associated with the client's difficulties (e.g., Sarason & Ganzer, 1969) or by developing some vehicle in which problem solving is taught indirectly, not through modeling or instruction but by the demands of the training task (e.g., Blechman, 1974). Because the particular examples chosen for training can vary greatly, emphasis is put on learning the process rather than the specifics of a given situation. It is hoped that the problem-solving skills will be applied to actual problems as they arise in the future. Perhaps the most significant feature of problem-solving training is helping the client to intersperse some cognitive behaviors rather than to accept solutions or engage in uncritical behaviors, thus spontaneously breaking the automaticity of maladaptive responsivity.

In summary, the problem-solving approach views maladaptive behaviors as deficiencies in systematic problem-solving skills. Treatment is designed to help clients learn how to specify problems, generate alternative solutions, tentatively select solutions, and verify the solutions. Mahoney (1977) has called this a *personal scientist* approach where clients are taught to approach problematic situations in a manner similar to that in which a scientist attacks a theoretical problem. Common to each of the problem-solving approaches is an attempt to teach the client to engage in covert problem solving entailing stimulus transformation, cognitive rehearsal, and test of alternative solutions (cf. D'Zurilla & Goldfried, 1971; Goldfried & Goldfried, 1975; Mahoney, 1974, 1977; Spivack & Shure, 1974).

Self-Regulation Training

Self-regulation training is concerned particularly with the self-control patterns of the individual. Kanfer (1970, 1971) postulated a three-phase model of self-control that forms the basis for many of the self-regulation procedures employed. According to Kanfer's model, a person must first self-monitor his or her performance. This factor of attention is often instigated by an event that marks a deviation from normal functioning. Self-monitoring is followed by a phase of self-evaluation in which the person compares his or her monitored performance to goals or standards based on prior learning. If the performance matches or exceeds these goals, self-reinforcement can occur. A substandard performance can elicit self-criticism or an attempt to repeat and improve performance.

In summary, clients are encouraged to employ self-monitoring to identify the specific maladaptive habits. The therapist then aids the client in establishing appropriate goals. The next step involves the description of procedures that can modify the environment (i.e., "stimulus control"). Stimulus control relies on the cuing function of environmental events. The basic strategy in stimulus control is one of progressively reducing or eliminating the cues in the environment associated with

undesirable behavior and the simultaneous extension of stimuli that correlate with more adaptive behavior. For example, clients with problems maintaining appropriate study skills might be encouraged to set aside a certain area solely for the purpose of studying, removing extraneous material (magazines, food) that competes with the desirable behavior. In short, the client is encouraged to arrange his or her physical environment in such a way as to facilitate or inhibit a target symptom. Finally, clients are encouraged to reward their behavior contingent on the performance of some desired response and to self-administer some aversive stimulus contingent on the performance of some undesirable response. This entire process of self-monitoring, goal setting, stimulus control, self-reward, and self-punishment is designed to enhance the self-control process. In a sense, the client is able to perform the therapist's function in terms of knowing when some behavior requires attention.

In this section, a brief description of cognitive learning approaches has been presented. Many of the procedures cross the different approaches but were described separately to clarify specific aspects of cognitive learning therapies. These procedures have been developed and applied mostly with traditional mental health populations, for example, phobics, depressed individuals, hyperaggressive clients, and alchoholics. However, they are readily applicable to most health maintenance and illness-related problems. The application of cognitive learning approaches to health care will be presented in the next two sections.

COGNITIVE LEARNING APPROACHES APPLIED TO HEALTH CARE

In earlier portions of this chapter, emphasis was placed on the individual's propensity to continually search for, examine, and evaluate the cues presented by situations and by his or her behavior. The important issue from the standpoint of the current section is how patients facing impending aversive stimulation (events; e.g., noxious medical and surgical procedures), currently exposed to intense stimulation (e.g., chronic pain), or overresponsive to threatening stimuli (e.g., migraine headaches, peptic ulcers) can be helped to alter their conceptions such that the situations become less threatening. In short, what strategies or approaches can the health care provider employ to effect more adaptive responding?

Much of the coping process is anticipatory in nature and is initiated prior to a confrontation with a threat or stress such as impending surgery. One suggestion frequently made is that if individuals prepare effectively, mastering danger before it materializes, they will alter the nature of their ultimate transactions with the situations along with emotions that might be experienced in the absence of such anticipatory coping (Janis, 1958). Overcoming the danger before it materializes can result in the prevention or short-circuiting of such negative emotions as fear, grief, or depression,

which may exacerbate the perception and subsequent response to the aversive stimuli. Janis (1958) suggests that preparatory communications can serve as "emotional inoculation." In Janis's view, the patient who receives accurate and detailed information about what he or she is likely to experience will demonstrate more anticipatory fear but will reveal a reduction in poststress complications and acute emotional disturbance.

Preparatory Information

Two different approaches have been employed in the area of preparatory information. One group of investigators has attempted to instigate "cognitive control" over the impending stress by providing patients with information about the physical properties (e.g., onset, duration, procedural details) and objective characteristics of the stress situation, about the sensations likely to be experienced as a function of the stress event (e.g., what is likely to be felt, heard), or a combination of both (e.g., Andrew, 1970; DeLong, 1971; Finesilver, 1978; Johnson, Morrissey, & Leventhal, 1973). This approach is analogous to the rational-restructuring approach described above with the emphasis on reappraisal of the threatening situation. A second group of studies provides not only information about the stimulus event and sensations but also information (and sometimes training) regarding behaviors that could have some direct effect on the aversive stimulation. The information included in this second approach relates to specific coping skills that the patient can employ to help gain some measure of control over the noxious events (e.g., Egbert, Batit, Welch, & Bartlett, 1964; Elms & Leonard, 1966; Fuller, Endress, & Johnson, 1977; Langer, Janis, & Wolfer, 1975). This second approach combines cognitive restructuring and the coping-skills training procedures described previously. Although the different studies employing preparatory information have been grouped into two different clusters, they differ in a number of ways beyond the content of the preparatory message. For example, the manner in which the information is presented varies from audiotapes to written materials. When and how the information is provided also varies (e.g., immediately prior to the stressful event vs. months ahead of time, one presentation vs. several, imposition of coping strategies by a health care provider vs. reinforcement of spontaneously employed coping strategies), as does who presents the material (e.g., nurse vs. anesthesiologist). All of these factors need to be considered when preparatory information is employed (see Turk & Genest, 1979).

Examination of the study of Johns n et al. (1973) will illustrate the first approach to the provision of preparatory information. In this study, patients about to undergo gastrointestinal endoscopic examinations were provided with different preparatory messages regarding either objective characteristics of the procedure or a combination of objective information and information about sensations and arousal that were likely to be experienced.

The gastrointestinal endoscopic examination is a diagnostic test that includes a series of potentially threatening, noxious steps. These include throat swabbing to achieve local anesthesia, intravenous puncture, passage of a flexible fiber-optic tube (12 cm in diameter and approximately 90 cm in length) into the throat, retention of the tube from 30 to 90 minutes, and tube removal.

The group receiving the procedural information was presented with a description of the various stages of the examination including descriptions of the clinic where the examination would be performed, a description of the fiber-optic tube, and an explanation of how the gastrointestinal tract could be photographed through the tube. The message also included statements regarding throat swabbing, intraveneous medication, the patient's position on the examination table, the lighting of the examination room, and the pumping of air into the stomach. Finally, patients were reassured as to the skill and experience of the medical team and were provided with photographs showing the equipment to be employed. Patients in the combined procedural and sensory information group were provided with the same procedural information as the first group and, in addition, sensory information such as the feel of the needle stick, drowsiness, sensations of fullness in the stomach when air is pumped in, and so forth.

Johnson et al. (1973) reported that both groups provided with the preparatory messages (procedural information alone and in combination with sensory information) required less medication to produce sedation than a control group. However, only the patients who heard the combined message showed less tension during tube passage and less restlessness during the examination and tended to have less heart rate acceleration during the examination than did the control group.

The hypothesis that information about procedural details and sensations will result in reduction of distress and more adaptive recovery receives some support, but the data is equivocal. For example, Johnson, Rice, Fuller, and Endress (1978) were able to demonstrate the utility of such preparatory information for cholecystectomy surgery patients but failed to obtain any effect on recovery for herniorrhaphy surgical patients. Langer et al. (1975) reported that patients receiving sensory information prior to surgery evidenced more anticipatory stress than did a group who received no information but that the information had no positive effect on reaction to surgery or speed of recovery. In a series of studies (Andrew, 1970; Auerbach, Kendall, Cuttler, & Levitt, 1976; DeLong, 1971) the utility of presurgery preparatory information was differentially effective for patients depending on coping style.

The second approach to the provision of preparatory information includes knowledge about various coping strategies that can be employed in addition to sensory and procedural information. Coping-skills information can include relaxation and deep breathing to reduce arousal, how to move and ambulate without exacerbating discomfort following surgery,

leg exercises, coughing, and so forth. The nature of the coping skills described depends to some extent on the specific features of the stress likely to be encountered.

In many situations, there is no action a person can reasonably take to eliminate discomfort and distress, either because the injury has already occurred or is to some extent inevitable (e.g., debridement of burns). In such situations the individual may have to rely on cognitive coping skills or what Lazarus, Averill, and Opton (1974) have called "intrapsychic cognitive devices" to cope (e.g., attention deployment, reappraisal, or reinterpretation). To make the coping-skills approach more concrete, several illustrative studies can be examined.

In a recent study, Kendall and his colleagues (Kendall, Williams, Pechacek, Graham, Shisslak, & Herzoff, 1979) examined the relative efficacy of a regimen composed of cognitive and behavioral control strategies compared to a patient education group (which received procedural information), an attention placebo intervention, and a no-treatment control group. Patients in the Kendall *et al.* study were all to undergo a particularly stressful cardiac catheterization procedure involving the insertion of a small catheter into an artery and vein in the groin and advancing it into the heart. Through the catheters, physicians are able to obtain samples of blood directly from the heart and to measure blood pressure in the heart chambers, as well as to visualize the main pumping chambers of the heart and coronary arteries.

The coping-skills group in the Kendall *et al.* (1979) study was exposed to a series of procedures focused on labeling the stress, identifying stress-related cues, discussion of cognitive coping, reinforcement of cognitive coping styles, cognitive rehearsal, and experimenter performing as a coping model (the experimenter modeled coping strategies employed, negative thoughts, aversive arousal, and ways of coping with these as well as the discomfort; for a discussion of coping versus mastery models, see Meichenbaum, 1971). One point that deserves emphasis in the Kendall *et al.* approach is the encouragement and reinforcement of the patient's own cognitive coping strategies. No cognitive coping strategies were imposed on the patients by the investigator. The results of this study support the utility of such a comprehensive approach. The coping-skills group demonstrated the highest rating of adjustment (assessed by physicians and technicians) and the lowest levels of anxiety.

In another study, Langer *et al.* (1975) provided one group of subjects with a combined procedural, sensory, and coping-skills treatment designed to reduce stress and augment postsurgical recovery. Subjects in the combined group were trained to reappraise anxiety-provoking cues and events through presentation of a conceptualization of stress (by analogy to other stress situations) and by alteration of negative internal dialogues. Training in the use of attention-diverting cognitive coping strategies was also included. Subjects receiving this combined training were compared to groups receiving only procedural and sensory information, skills train-

ing with the exclusion of the preparatory information, and no specific preparation. The combined group and coping-skills training group demonstrated less pre- and postoperative stress (rated by nurses) than the other two groups. These two cognitive-behavioral training groups requested less analgesic medication with a smaller proportion of patients requesting sedatives than either of the other two groups; there was no difference between the information-alone and no-treatment control groups.

The studies presented here are just two examples of cognitive learning approaches that have been employed with populations who undergo some noxious medical examination (cf. Fortin & Kirouac, 1976; Fuller *et al.*, 1977; Wolfer & Visintainer, 1975). They demonstrate the utility of cognitive learning approaches with such patient populations. The extent of the training employed in coping-skills training varies widely. For example, we can contrast the relatively brief approach of Langer *et al.* (1975) with that of Fortin and Kirouac (1976). Fortin and Kirouac provided herniorrhaphy and cholecystectomy patients with (a) an orientation to the surgical experience and hospital, (b) elementary biological facts related to their surgeries, (c) the purpose and techniques of respiratory and muscular exercises including routines to be followed postsurgically, (d) techniques for changing position to minimize postsurgical nausea, vomiting, pain, dizziness, and weakness, and so forth. Which components of such treatments are necessary has not been established, nor have comparisons between various combinations of cognitive and noncognitive techniques been reported. However, a rule of thumb suggested by Mahoney (1974) seems appropriate to all of the combined treatments reviewed: "First show an effect, then conduct component analyses and comparative studies" (p. 199). Employing cognitive learning techniques with noxious medical procedures seems to have some utility. The results to this point, although tentative, are encouraging.

The studies reviewed in this section illustrate the utility of both rational restructuring and coping-skills training in preparing patients for aversive diagnostic and surgical procedures. Although the studies discussed dealt specifically with adults, similar approaches have been employed with children, using modeling films (Melamed & Siegel, 1975; Vernon & Bailey, 1972) as well as puppets and coloring books (Cassell, 1965) to convey preparatory information.

Chronic Conditions

The studies reviewed in the previous section focused on the use of cognitive learning approaches for prevention of distress and discomfort. Patients with various chronic conditions are already experiencing noxious stimulation. A variety of cognitive learning approaches have been employed with chronic-pain patients and, more recently, patients with chronic illnesses (e.g., cancer).

Chronic Pain

Phantom limb pain, osteoarthritis, low-back pain, fibrositis, and abdominal pain are just a few of the chronic-pain syndromes that have been treated with cognitive learning techniques in conjunction with traditional medical regimens. Extended reviews of this literature have recently been reported (Turk, 1978; Turk & Genest, 1979), thus, only a few illustrative studies will be considered here.

In one study, Gottlieb, Strite, Koller, Madorsky, Hockersmith, Kleeman, and Wagner (1977) treated a number of patients with chronic back pain who had poor demographics (e.g., their complaint of back pain had persisted for 6 months or more, they were unable to work and were supported by social security, welfare, or disability payments, and they continued, despite previous surgery, to seek medical or surgical relief). Sternbach (1974) has labeled such patients "low-back pain losers." The training employed by Gottlieb et al. was quite complex and included the following elements:

1. Biofeedback training for teaching self-regulated muscle relaxation
2. Psychological counseling emphasizing self-control techniques for management of stress and anxiety
3. Patient-regulated medication program
4. Patient-involved case conferences
5. Physical- therapy program emphasizing reconditioning of muscles
6. Comprehensive vocational-rehabilitation services
7. A series of educational lectures about the relationship between stress and back pain
8. A therapeutic milieu designed for maximum relaxation, recreation, and socialization
9. Individual, group, and/or family therapy

Obviously, this is quite a comprehensive and expensive inpatient treatment program (mean hospitalization, 45 days), but given the refractory nature of the problem such a "total" program may be required.

The poor prognosis of the low-back pain patients treated by Gottlieb et al. (1977) makes the results most encouraging. Gottlieb et al. report that 79% of the patients demonstrated unimpaired levels of physical functioning, and 82% were at success levels (employed or in training) at discharge. At 6-month follow-up, 82% of the 23 patients contacted were employed or in some training program.

In contrast with the lengthy treatment program provided by Gottlieb et al., Acharya, Michaelson, and Erickson (1978) developed a cognitive learning approach based on rational restructuring and problem-solving training that lasted 2 weeks, and Rybstein-Blinchik and Grzesiak (1977) developed an intervention consisting of rational restructuring, coping-skills training, and self-reinforcement that included only 4 hours of training extended over a 3-week period.

Acharya *et al.* (1978) treated groups of four to six patients by teaching problem-solving skills focusing on patients' sense of worthlessness, lack of structure in daily life due to inactivity, marital and family conflicts, sexual dysfunctions, uncertain vocational futures, reduced social and leisure activities, and financial complications. Patients were also helped to understand the nature of pain and the impact of pain on their lives and were weaned from addictive analgesic agents. Following discharge (5–23 months), 48% of the patients who had received the treatment were no longer actively seeking further medical treatment, and 52% were undergoing only routine follow-ups. The authors report that at follow-up 71% of the treated patients were working in some capacity in contrast with 41% prior to treatment. In addition, patients reported substantial improvements in self-ratings of emotional status, attitudes, and relationships subsequent to treatment.

Arthritic-pain patients, a paraplegic patient, and a quadriplegic patient with persistent pain were treated in a group by Rybstein-Blinchik and Grzesiak (1977). In this study, patients were provided with a conceptualization of pain and trained to be aware of their thoughts and self-instructions prior to and during the experience of pain. Patients were trained to engage in a coping strategy that was related to, but inconsistent with, the experience of pain. To consolidate the use of such strategies, patients were asked to role-play relating the content of these strategies to other group members. Finally, patients were encouraged to self-reinforce themselves when they employed the coping strategies. Rybstein-Blinchik and Grzesiak report substantial reductions in pain both at termination of treatment and at 1-month follow-up.

All of these studies are limited by the omission of control groups, but the lack of effective prior medical intervention and the magnitude of the changes support the utility of such cognitive learning approaches with chronic-pain patients. From the data presented, the active ingredients of these complex treatments cannot be determined. Component analyses should be conducted to assess the necessary and sufficient aspects of these cognitive learning regimens.

Chronic Illness

All chronic illnesses represent assaults on multiple areas of functioning, not just the body. Chronic illnesses can force separation from family, friends, and other sources of gratification, the loss of key roles, disruption of plans for the future, assault on self-images and esteem, uncertain and unpredictable futures, distressing emotions such as anxiety, depression, resentment, and helplessness, and such illness-related factors as permanent change in physical appearance or in bodily functioning (Turk, 1979). The importance of problem-solving attitudes and personal mastery have been identified as important contributors to the quality of adaptation to

chronic illness (Follick & Turk, 1978; Turk, 1979; Weisman & Sobel, 1979).

In contrast to the circumstances described above for acute and chronic pain in which cognitive learning approaches were described as adjuncts to traditional medical treatment, they can provide the primary intervention for enhancing adaptation to chronic illnesses. Cognitive learning approaches can be of some utility in helping to alter the situation out of which problematic experiences arise, controlling the meaning of the problematic experience after it occurs but before the emergence of distress and/or controling stress after it has emerged. Thus, rational restructuring, coping skills, and problem-solving training can facilitate the adaptive process (Turk, 1979).

The use of cognitive learning approaches in fostering adaptation to chronic illnesses has received much less attention than its use in the area of chronic pain. Recently, Weisman and Sobel (1979; see also Sobel, 1978) have begun to employ rational restructuring and problem-solving and coping-skills training, as well as self-control training, with cancer patients to help them adapt to their plight.

Weisman and Sobel (1979) describe the following problem-solving steps employed in treating cancer patients:

> (a) identifying the primary affect, (b) defining the uppermost problem and subsidary concerns, (c) generating alternative solutions, (d) imagining how others might respond if asked to solve similar problems, (e) considering pros and cons of each proposed solution, (f) rank ordering all possible solutions, (g) selecting the most acceptable or feasible solution, and (h) re-examining or redefining the original problem in the light of the assessment. (p. 13)

These authors have only begun to employ this approach with cancer patients, but the preliminary findings are encouraging (Sobel, 1978). The efficacy of cognitive learning approaches with various chronic illnesses remains to be tested, but work in this area has begun (Follick & Turk, 1978; Weisman & Sobel, 1979).

Stress-Related Disorders

The importance of cognitive and emotional factors in stress-related disorders has been noted for a long time and forms the basis of the medical specialty of psychosomatic medicine. Cognitive learning approaches have been employed with several of these disorders, including migraine headaches (e.g., Mitchell & White, 1977), tension headaches (e.g., Holroyd, Andrasik, & Westbrook, 1977), peptic ulcers (e.g., Chappell & Stevenson, 1936), essential hypertension (e.g., Suinn, 1975), and irritable-bowel syndrome (e.g., Harrell & Beiman, 1978). In contrast with many of the studies reviewed above, which were designed to palliate symptoms (e.g., chronic pain), the cognitive learning approaches developed to treat stress-related disorders are designed to prevent or short-circuit noxious sensations before they crystallize into specific symptoms.

To illustrate the utility of such approaches, several stress-related disorders will be considered.

Muscle Contraction Headache

The exact etiology of muscle contraction headache is unclear. There is, however, a general consensus that muscle contraction headaches (1) are an individual's response to psychological stress and (2) may result from excessive and sustained contraction of the frontalis (forehead), scalp, or neck muscles (Turk, Meichenbaum, & Berman, 1979).

Holroyd et al. (1977) employed a rational-restructuring treatment that focused on altering maladaptive cognitive responses assumed to mediate the occurrence of muscle contraction headaches. Patients were provided with a rationale for treatment emphasizing the function of specifiable maladaptive cognitions in the creation of subsequent disturbing emotional and behavioral responses (based on Beck, 1976; Meichenbaum, 1977). Patients were encouraged to attribute the cause of their headaches to relatively specific cognitive self-statements rather than to external or complex internal dispositions. Lists of stressful situations were constructed, and patients were taught to focus on (a) the cues that trigger tension and anxiety, (b) how they responded when anxious, (c) thoughts prior to becoming tense and following such an episode, and (d) the way in which these cognitions contributed to the tension headaches. Following this sequence, patients were instructed to deliberately interrupt the sequence preceding their emotional responses at the earliest possible point and to engage in cognitive control techniques incompatible with further stress and tension (e.g., cognitive reappraisal, attention deployment, fantasy).

This rational-restructuring regimen was employed with 10 tension headache patients who were compared to patients receiving either biofeedback or no specific treatment. The training consisted of eight biweekly sessions with a 15-week follow-up. At the termination of treatment and at follow-up, only the cognitive learning group demonstrated significant improvement on frequency, duration, and intensity of headaches.

Migraine (Vascular) Headache

The existing data on the pathophysiology of migraine headaches is sparse. The available physiological evidence suggests that migraine headache is associated with (1) excessive cranial vasculature responsivity and (2) autonomic nervous system instability (Bakal, 1975). The symptoms of migraine headaches are thought to be mediated through the autonomic nervous system and are often evidenced by increased blood flow in the head resulting in painful dilation and distension of the cranial arteries (Turk et al., 1979).

A complex cognitive learning regimen consisting of rational restructuring, coping-skills training, and self-control training was employed by Mitchell and White (1977) with a migraine headache population. In this study a sequential "dismantling" strategy (Romanczyk, Tracey, Wilson, & Thorpe, 1973), by which the effect of each phase of the cognitive learning regimen was separated into four components, was employed. Subsets of the initial group of patients received one, two, three, or all four of the components. That is, all patients began at the same point, receiving self-recording, the first component of the treatment package. A subset of the initial group returned for the addition of the second component, self-monitoring, a subset of this group returned for the presentation of the third component, and finally a subset of these returned for the fourth and last phase of the treatment. In this manner, the contribution of each phase of the package was assessed.

The four components employed by Mitchell and White (1977) consisted of (1) self-recording of the frequency of migraine episodes, (2) self-monitoring of antecedent stress cues, (3) physical and mental relaxation and self-desensitization, and (4) thirteen additional cognitive- and behavioral-control strategies (e.g., thought stopping, imaginal modeling, rational thinking). The patients were treated in groups so that 12 patients received the self-recording component, 9 the self-recording and self-monitoring, 6 the self-recording, self-monitoring, physical and mental relaxation, and self-desensitization, and 3 received all four components. Patient contact was only once per component, with 12 weeks intervening between components. The majority of the training was conducted by a series of tapes that the patients heard and practiced at home. After the 60 weeks of training (only four personal contacts between patients and trainer), a 3-month follow-up was conducted. Mitchell and White (1977) reported that neither self-recording nor self-monitoring produced substantive reductions in migraine episodes. Significant reduction in migraine frequency was displayed by the groups receiving both three and four components; however, the group that received all four components significantly decreased migraine attacks at 60 weeks and at the 3-month follow-up relative to the group receiving the three components.

Both the Holroyd et al. (1977) and Mitchell and White (1977) studies suggest that training in cognitive- and behavioral-control strategies can help individuals to adapt and modify their environments. These treatments attempt to have patients reappraise situations previously perceived as unmanageable, tension producing, and beyond their control. The cognitive learning approaches are designed to prevent the development of the headache rather than specifically to cope with headaches once they have developed. Thus, in these two studies the treatment focus is on prevention, whereas in the Gottlieb et al. (1977) study the full cognitive-behavioral armamentarium is applied to chronic patients. A common goal of treatment for acute and for chronic pain is both to alter

the experience and response to noxious sensations that are already present and to alter the environment that potentiated such intense sensations. The point to note here is that with many pain populations the goal of treatment should be not only to teach techniques for enduring the noxious stimulation but to foster approaches to altering environments that exacerbate the pain experience and response.

The procedure employed by Mitchell and White (1977) is exciting, given the relative efficacy and cost-effectiveness of the approach. Patients were seen in groups in at most four sessions with the trainer; the majority of the training was incorporated in a series of tapes. The automation of such packages deserves further attention if we consider the ultimate goal of such therapeutic regimens to be the utilization of psychological approaches by a variety of health providers who are unlikely to expend inordinate amounts of time with a small number of patients (e.g., Gottlieb *et al.*, 1977).

Peptic Ulcer

Ulcers are chronic lesions that extend into the wall of the stomach or duodenum. Because ulcers are quite common, laymen have tended to view the condition as a relatively mild inconvenience that simply requires controlled dieting; however, it has been estimated that peptic ulcers cause about 10,000 deaths annually in the United States (Lachman, 1972). Peptic ulcers can be an extremely serious condition.

Interestingly, one of the first successful reports of the utility of cognitive learning approaches has languished in the literature since 1936, when Chappell and Stevenson treated 32 peptic ulcer patients with a cognitive learning appraoch that included (1) information regarding the relationship between emotions and gastric physiology and (2) "directive therapy" consisting largely of instructions on how to change habitual patterns of thinking that exacerbate gastric overresponding (e.g., disruption of worry and ruminative thinking by employing specific cognitive coping strategies and self-instructions). This intervention was combined with the standard medication and dietary regimen typically employed with ulcer patients.

The patients receiving the cognitive learning treatment were compared to a group of patients who were treated exclusively with medication and a controlled diet. At the end of a 2-month period, only one of the patients receiving the cognitive learning treatment reported any recurrence of painful symptoms, whereas 19 of the 20 control patients had serious recurrences. At a 3-year follow-up, 10 of the patients who had received the cognitive learning treatment were still symptom free, whereas none of the control subjects were free of recurrences.

In this section, studies that have employed cognitive learning treatments with several stress-related disorders were reviewed. Although

work in this area is still rudimentary and conclusions must be tentative, the results are promising and warrant further investigation and extension to other disorders potentiated by specific cognitive appraisals.

SUMMARY AND CONCLUSIONS

One theme that has run throughout this chapter has been the important contributions of individuals' belief systems, conceptions, and cognitive processes in all aspects of behavior. Emphasis has been placed on the importance of cognitive factors in all phases of health-relevant behavior.

The utility of cognitive learning approaches for altering patients' perceptions of their responsibilities for health maintenance and for modification of maladaptive responding and arousal was illustrated in a variety of circumstances, namely, perceptions of control of threatening stimuli and coping with noxious stimulation and aversive circumstances. The rationale of cognitive learning approaches rests on the assumption that individuals can be taught to acquire new patterns of thinking, fantasizing, planning, and initiating adaptive behavior. The cognitive learning therapist serves in the role of an instigator or motivator to help patients change self-conceptions and situations. The responsibility for carrying out the program and for maintaining the effectiveness of the procedures rests ultimately with the individual. The therapist tries to help patients gain a sense of control over emotions and behavior. He or she helps patients feel that they are active contributors to their own experiences and not helpless victims. The empirical evidence strongly suggests that therapeutic settings in which individuals perceive themselves as exerting some control over treatment objectives and methods, or at least see themselves as active participants, should enhance motivation and responsibility. It is the individual patient's active participation that should foster generalization, maintenance, and adherence to therapeutic regimens.

Health care providers should investigate what types of cognitions regarding health, illness, and the therapeutic process will facilitate appropriate actions (and consequently, what types of cognitions are likely to preclude appropriate actions). If they can answer this question, the health care providers are immediately faced with a second: What can they do to insure that their audience or patients' cognitions about the change process are positive rather than negative. The cognitive learning approaches described throughout this chapter illustrate some of the strategies that can be employed to enhance adaptive behaviors.

The cognitive learning approaches reviewed are not considered as alternatives to conventional medical treatments but rather as integral parts of health providers' armamentarium. Consideration of cognitive factors to the exclusion of biological and environmental factors is inap-

propriate and would result in dualistic thinking. Rather, the organism must be viewed as a psychobiological unit.

Although the cognitive learning approaches appear promising, a number of questions remain to be answered. For example, what are the active ingredients of such multifaceted approaches, how well does maintenance of the positive effects observed hold up over time, and do these changes generalize to different settings? Much of the data presented is preliminary and requires replication. The procedures described appear readily applicable to other health conditions and circumstances. Work in this area is still quite rudimentary and deserves additional attention.

REFERENCES

Acharya, A., Michaelson, M. A., & Erickson, D. L. *Use of problem-solving approach in the treatment of chronic pain.* Paper presented at the 2nd World Congress on Pain, Montreal, 1978.

Andrew, J. M. Recovery from surgery with and without preparatory instruction for three coping styles. *Journal of Personality and Social Psychology,* 1970, *15,* 223–226.

Auerbach, S. M., Kendall, P. C., Cuttler, H. F., & Levitt, M. R. Anxiety, locus of control, type of preparatory information and adjustment to dental surgery. *Journal of Consulting and Clinical Psychology,* 1976, *44,* 809–818.

Bakal, D. H. Headache: A biopsychological perspective. *Psychological Bulletin,* 1975, *82,* 364–382.

Bandura, A. *Principles of behavior modification.* New York: Holt, Rinehart, & Winston, 1969.

Bandura, A. *Social learning theory.* Englewood Cliffs, N.J.: Prentice-Hall, 1977.

Barber, T. X., & Hahn, K. W. Physiological and subjective responses to pain producing stimulation under hypnotically suggested and waking-imaged "analgesia." *Journal of Abnormal and Social Psychology,* 1962, *65,* 411–418.

Beck, A. T. Cognitive therapy: Nature and relation to behavior therapy. *Behavior Therapy,* 1970, *1,* 184–200.

Beck, A. T. *Cognitive therapy and the emotional disorders.* New York: International Universities Press, 1976.

Beecher, H. K. The powerful placebo. *Journal of the American Medical Association,* 1955, *159,* 1602–1606.

Blechman, E. A. The family contract game. *The Family Coordinator,* 1974, *23,* 269–281.

Cassell, S. Effects of brief puppet therapy upon the emotional responses of children undergoing cardiac catheterization. *Journal of Consulting Psychology,* 1965, *29,* 1–8.

Chappell, M. N., & Stevenson, T. I. Group psychological training in some organic conditions. *Mental Hygiene,* 1936, *20,* 588–597.

Davis, M. S. Variations in patients' compliance with doctors' orders: Analysis of congruence between survey responses and results of empirical investigations. *Journal of Medical Education,* 1966, *41,* 1037–1045.

Dekker, E., & Groen, J. Reproducible psychogenic attacks of asthma. *Journal of Psychosomatic Research,* 1956, *1,* 58–67.

DeLong, R. D. Individual differences in patterns of anxiety arousal, stress-relevant information, and recovery from surgery. *Dissertation Abstracts International,* 1971, *32,* 554.

Dubos, R. *The mirage of health: Utopias, progress and biological change.* New York: Doubleday, 1971.

D'Zurilla, T. J., & Goldfried, M. R. Problem solving and behavior modification. *Journal of Abnormal Psychology,* 1971, *78,* 107–126.

Egbert, L., Batit, G., Welch, C., & Bartlett, M. Reduction of postoperative pain by encouragement and instruction. *New England Journal of Medicine*, 1964, *270*, 825–827.

Ellis, A. *Reason and emotion in psychotherapy*, New York: Lyle Stuart, 1962.

Elms, R., & Leonard, R. L. Effects of nursing approaches during admission. *Nursing Research*, 1966, *15*, 39–48.

Finesilver, C. Preparation of adult patients for cardiac catheterization and coronary cineangiography. *International Journal of Nursing Studies*, 1978, *15*, 211–221.

Follick, M. J., & Turk, D. C. *Problem specification by ostomy patients.* Paper presented as part of the symposium, "A Sequential Analysis of Coping with Physical Illness: A Cognitive and Behavioral Approach," H. Sobel (chairperson), Association for the Advancement of Behavior Therapy, 12th Annual Convention, Chicago, 1978.

Fortin, F., & Kirouac, S. A randomized controlled trial of preoperative patient education. *International Journal of Nursing Studies*, 1976, *13*, 11–24.

Fuller, S. S., Endress, M. P., & Johnson, J. E. *Control and coping with an aversive health examination.* Paper presented at the annual meeting of the American Psychological Association, San Francisco, 1977.

Gentry, W. D. Preadmission behavior. In W. D. Gentry & R. B. Williams, Jr. (Eds.), *Psychological aspects of myocardial infarction and coronary care.* St. Louis: C V Mosby, 1975.

Goldfried, M. R. Systematic desensitization as training in self-control. *Journal of Consulting and Clinical Psychology*, 1971, *37*, 228–234.

Goldfried, M. R., & Goldfried, A. Cognitive change methods. In F. Kanfer & A. Goldstein (Eds.), *Helping people change.* New York: Pergamon, 1975.

Gottlieb, H., Strite, L., Koller, R., Madorsky, A., Hockersmith, V., Kleeman, M., & Wagner, J. Comprehensive rehabilitation of patients having chronic low back pain. *Archives of Physical Medicine and Rehabilitation*, 1977, *58*, 101–108.

Grace, W. J., Wolf, S., & Wolff, H. G. *The human colon.* New York: Hoeber, 1951.

Hackett, T. P., & Cassem, H. Psychological management of the myocardial infarction patient. *Journal of Human Stress*, 1975, *1*, 25–38.

Harrell, T. H., & Beiman, I. Cognitive-behavioral treatment of the irritable colon syndrome. *Cognitive Therapy and Research*, 1978, *2*, 371–376.

Holroyd, K. A., Andrasik, F., & Westbrook, T. Cognitive control of tension headache. *Cognitive Therapy and Research*, 1977, *1*, 121–133.

Janis, I. *Psychological stress.* New York: Wiley, 1958.

Janis, I., & Rodin, J. Attribution, control and decision making: Social psychology and health care. In G. Stone, N. Adler, & F. Cohen (Eds.), *Health psychology.* San Francisco: Jossey-Bass, 1979.

Johnson, J. E., Morrissey, J. F., & Leventhal, H. Psychological preparation for an endoscopic examination. *Gastrointestinal Endoscopy*, 1973, *19*, 180–182.

Johnson, J. E., Rice, V. H., Fuller, S. S., & Endress, M. P. Sensory information, instruction in a coping strategy, and recovery from surgery. *Research in Nursing and Health*, 1978, *1*, 4–17.

Jonas, S. *Medical mystery: The training of doctors in the United States.* New York: Norton, 1978.

Kanfer, F. H. Self-regulation: Research, issues and speculations. In C. Neuringer & J. L. Michael (Eds.), *Behavior modification in clinical psychology.* New York: Appleton-Century-Crofts, 1970.

Kanfer, F. H. The maintenance of behavior by self-control stimuli and reinforcement. In A. Jacobs & L. B. Sachs (Eds.), *The psychology of private events.* New York: Academic Press, 1971.

Katz, J., Weiner, H., Gallagher, T., & Hellman, L. Stress, disease and ego defenses. *Archives of General Psychiatry*, 1970, *23*, 131–142.

Kendall, P., Williams, L., Pechacek, T. F., Graham, L. E., Shisslak, C., & Herzoff, N. The Palo Alto medical psychology project: Cognitive-behavioral patient education interven-

tions in catheterization procedures. *Journal of Consulting and Clinical Psychology,* 1979, *47,* 49–58.

Klein, R. F. Relationship between psychological and physiological stress in the coronary care unit. In W. D. Gentry & R. B. Williams, Jr. (Eds.), *Psychological aspects of myocardial infarction and coronary care.* St. Louis: C. V. Mosby, 1975.

Klein, R. F., Dean, A., & Willson, M. L. The physician and postmyocardial infarction invalidism. *Journal of the American Medical Association,* 1965, *194,* 123–128.

Lachman, S. J. *Psychosomatic disorders: A behavioristic interpretation.* New York: Wiley, 1972.

Langer, E., Janis, I., & Wolfer, J. Reduction of psychological stress in surgical patients. *Journal of Experimental Social Psychology,* 1975, *1,* 155–166.

Lazarus, R. S. *Psychological stress and the coping process.* New York: McGraw-Hill, 1966.

Lazarus, R. S. Psychological stress and coping in adaptation and illness. *International Journal of Psychiatry in Medicine,* 1974, *5,* 321–333.

Lazarus, R. S., & Launier, R. Stress-related transactions between person and environment. In L. A. Pervin & M. Lewis (Eds.), *Perspectives in interactional psychology.* New York: Plenum Press, 1978.

Lazarus, R. S., Averill, J. K., & Opton, E. M., Jr. The psychology of coping: Issues of research and assessment. In G. Coelho, D. A. Hamburg, & J. E. Adams (Eds.), *Coping and adaptation.* New York: Basic Books, 1974.

MacKay, C. *Extraordinary popular delusions and the madness of crowds.* New York: Farrar, Straus & Giroux, 1974.

Mahoney, M. J. *Cognition and behavior modification.* Cambridge, Mass.: Ballinger, 1974.

Mahoney, M. J. Personal science: A cognitive learning therapy. In A. Ellis & R. Grieger (Eds.), *Handbook of rational psychotherapy.* New York: Springer, 1977.

Mahoney, M. J., & Arnkoff, D. Cognitive and self-control therapies. In S. L. Garfield & A. E. Bergin (Eds.), *Handbook of psychotherapy and behavior change* (2nd ed.). New York: Wiley, 1978.

Maiman, L. A., Becker, M. H., Kirscht, J. P., Haefner, D. P., & Drachman, R. H. Scales for measuring health belief model dimensions: A test of predictive value, internal consistency, and relationship among beliefs. *Health Education Monographs,* 1977, *5,* 215–230.

Marston, M.-V. Compliance with medical regimens: A review of the literature. *Nursing Research,* 1970, *19,* 312–323.

Meichenbaum, D. H. Examination of model characteristics in reducing avoidance behavior. *Journal of Personality and Social Psychology,* 1971, *17,* 298–307.

Meichenbaum, D. H. Self-instructional methods. In F. H. Kanfer & A. P. Goldstein (Eds.), *Helping people change.* New York: Pergamon, 1975. (a)

Meichenbaum, D. H. Theoretical and treatment implications of developmental research on verbal control of behavior. *Canadian Psychological Review,* 1975, *16,* 22–27. (b)

Meichenbaum, D. H. *Cognitive-behavior modification: An integrative approach.* New York: Plenum Press, 1977.

Meichenbaum, D. H., & Cameron, R. The clinical potential of modifying what clients say to themselves. *Psychotherapy: Theory, Research and Practice,* 1974, *11,* 103–117.

Melamed, B. G., & Siegel, L. J. Reduction of anxiety in children facing hospitalization and surgery by use of filmed modeling. *Journal of Consulting and Clinical Psychology,* 1975, *43,* 511–521.

Miller, N. E. *The influence of past experience upon the transfer of subsequent training.* Unpublished doctoral dissertation, Yale University, 1935.

Mitchell, K. R., & White, R. G. Behavioral self-management: An application to the problem of migraine headaches. *Behavior Therapy,* 1977, *8,* 213–222.

Pranulis, M. Coping with acute myocardial infarction. In W. D. Gentry & R. B. Williams (Eds.), *Psychological analysis of myocardial infarction and coronary care.* St. Louis: C. V. Mosby, 1975.

Reiser, S. J. *Medicine and the reign of technology.* New York: Cambridge, 1978.

Rodin, J. Somatophysics and attribution. *Personality and Social Psychology Bulletin,* 1978, *4,* 531–540.

Romanczyk, R. G., Tracey, D. A., Wilson, G. T., & Thorpe, G. L. Behavioral techniques in the treatment of obesity. *Behavior Research and Therapy,* 1973, *22,* 629–640.

Rybstein-Blinchik, E., & Grzesiak, R. C. *Cognitive strategies in the treatment of chronic pain: A preliminary study.* Paper presented at the Association for the Advancement of Behavior Therapy, 11th Annual Meeting, Atlanta, 1977.

Sarason, I. G., & Ganzer, V. J. Social influence techniques in clinical and community psychology. In C. D. Spielberger (Ed.), *Current topics in clinical and community psychology* (Vol. 1). New York: Academic Press, 1969.

Schofield, A. T. *The force of mind.* London: J. & A. Churchill, 1902.

Sipperelle, C. N. Induced anxiety. *Psychotherapy: Theory, Research and Practice,* 1967, *4,* 36–40.

Sobel, H. J. *Coping, cognitive therapy and the cancer patient.* Paper presented as part of the symposium "A Sequential Analysis of Coping with Physical Illness: A Cognitive and Behavioral Approach," H. Sobel (chairperson), Association for the Advancement of Behavior Therapy, 12th Annual Convention, Chicago, 1978.

Spivack, G., & Shure, M. B. *Social adjustment of young children: A cognitive approach to solving real life problems.* San Francisco: Jossey-Bass, 1974.

Sternbach, R. A. The effects of instructional sets on autonomic responsivity. *Psychophysiology,* 1964, *1,* 67–72.

Sternbach, R. A. *Principles of psychophysiology.* New York: Academic Press, 1966.

Sternbach, R. A. *Pain patients: Traits and treatments.* New York: Academic Press, 1974.

Suinn, R. M. The cardiac stress management program for type A patients. *Cardiac Rehabilitation,* 1975, *15,* 13–15.

Suinn, R. M., & Richardson, F. Anxiety management training: A non-specific behavior therapy program for anxiety control. *Behavior Therapy,* 1971, *2,* 498–510.

Turk, D. C. Cognitive behavioral techniques in the management of pain. In J. P. Foreyt & D. P. Rathjen (Eds.), *Cognitive behavior therapy: Research and application.* New York: Plenum Press, 1978.

Turk, D. C. Factors influencing the adaptive process with chronic illness: Implications for intervention. In I. G. Sarason & C. D. Spielberger (Eds.), *Stress and anxiety* (Vol. 6). New York: Halstead Press, 1979.

Turk, D. C., & Genest, M. Regulation of pain: The application of cognitive and behavioral techniques for prevention and remediation. In P. Kendall & S. Hollon (Eds.), *Cognitive-behavioral intervention: Theory, research and procedures.* New York: Academic Press, 1979.

Turk, D. C., Meichenbaum, D. H., & Berman, W. H. The application of biofeedback for the regulation of pain: A critical review. *Psychological Bulletin,* 1979, *86,* 1322–1338.

Vernon, D. T. A., & Bailey, W. C. The use of motion pictures in the psychological preparation of children for induction of anesthesia. *Anesthesiology,* 1972, *40,* 68–72.

Weisman, A. D., & Sobel, H. J. Coping with cancer through self-instruction: A hypothesis. *Journal of Human Stress,* 1979, *5,* 3–8.

Wolf, S., & Goodell, H. *H. G. Wolff's stress and disease* (2nd ed.). Springfield, Ill.: Charles C Thomas, 1968.

Wolfer, J. A., & Visintainer, M. A. Pediatric surgical patients' and parents' stress responses and adjustment as a function of psychologic preparation and stress-point nursing care. *Nursing Research,* 1975, *24,* 244–255.

Relaxation Training and Relaxation-Related Procedures

JOHN PALMER ANDERSON

THE GENERAL APPROACH TO RELAXATION TRAINING

Men and women have earnestly sought a state called relaxation from the earliest of recorded times. Whether it be defined subjectively or, in the more recent scientific tradition, objectively, relaxation is universally considered a desirable and pleasant state. In this chapter, relaxation, relaxation training and related procedures, and the experimental evidence concerning the efficacy of relaxation training in applications to behavioral medicine will be discussed. Although relaxation *per se* is not always defined within systems of relaxation training, it is usually expected that relaxation is accompanied by a general muscular loosening and a slowing of the flow of thought. The techniques used to elicit such phenomena vary from the truly physical (progressive muscular relaxation) to the purely mental (hypnosis and imaginal relaxation).

There is a long history in psychology of the search for emotion in the peripheral nervous system or in specific organ locations. Such theories as the James–Lange and Cannon–Bard theories postulate a noncentral or peripheral basis for emotion or a specific location for it; and venerated behaviorists such as Watson (1930, p. 165) have entertained such notions.

JOHN PALMER ANDERSON • Division of Special Studies, University of Alabama, Birmingham, Alabama 35294.

The James–Lange Theory

This theory, put forward by William James in 1844 and subsequently by Carl Lange, asserts that a stimulus causes a visceral response and that the visceral response determines whatever emotion is perceived. Thus, the autonomic system is a mediator of emotion through its role in visceral arousal.

Cannon attacked this theory in the late 1920s on the basis of both the too-slow response of viscera and their too-small sensitivity. The question of explaining the full variety of human emotions on the basis of visceral reactions was also raised. Although there has been some experimental support for portions of this theory (see Schneider & Tarshis, 1975, p. 363; Toller, 1979, p. 131), it appears that it is incapable of explaining the full range of human behavior.

The Cannon–Bard Theory

This theory postulates a thalamic focus for emotion. In this view, impulses reach the brain cortex and modify the inhibitory action of the cortex on the thalamus, thus facilitating thalamic activity. These thalamic impulses then travel to both the brainstem and the cortex, thus producing both visceral responses and the sensations of emotion. Lashley questioned this theory on the ground that the thalamic focus was also too narrow to explain the full range of human emotional responses (see Schneider & Tarshis, 1975, p. 364).

Modern relaxation training systems are often used as aids to or portions of comprehensive systems of treatment within behavioral medicine; however, several of these relaxation procedures have been presented by their originators as comprehensive treatment systems for psychological and somatic disorders. In this original comprehensive view of relaxation training, then, is contained implicitly the peripheralist view of emotion. In another vein, systems of relaxation training may be viewed as the Western answer to Eastern contemplative systems.

Another general view of relaxation is that it is the opposite of anxiety. There are many subjective measures of anxiety available to practitioners and a few objective measures. Here too, peripheral theories for the genesis of anxiety can be found. Perhaps the lactate theory of Pitts and McClure (1967) is best known.

The Lactate Theory of Anxiety

In 1967, Pitts and McClure reported the results of a carefully controlled double-blind study of sodium lactate infusion in anxiety neurotics. These lactate infusions reliably produced anxiety symptoms and even anxiety attacks in stringently diagnosed anxiety neurotics; in contrast, saline solutions of similar osmolarity in normals produced few

anxiety signs at all. These findings have since been replicated in at least three other studies. Pitts also, however, proposed a peripheral theory for the creation of anxiety states (anxiety neurosis) in humans. This hypothesis gained considerable popularity and has elicited controversy as scientists have minutely examined different aspects of it.

Basically, it is proposed that blood levels of sodium lactate, created endogenously, create a hypocalcemia at the membrane boundaries of adrenergic receptors by the binding or chelating of calcium to the sodium lactate. The resulting somatic symptoms, resembling those of hypocalcemia, create anxiety symptoms and anxiety attacks. Pitts has furnished an organic chemical metabolic path from glycogen to lactate to explain the increase of sodium lactate levels in the blood. It is known from previous studies that exercise raises sodium lactate levels, and Pitts has argued that epinephrine released from the adrenal medulla can also raise the blood levels of lactate in the absence of exercise.

Subsequent to the widespread publicity of the lactate theory, Grosz and Farmer (1969) and Ackerman and Sachar (1974), among others, have pointed out that it has serious defects as a necessary and sufficient condition for the etiology of anxiety neurosis. These range from arguments that the endogenous sodium lactate differs from that used in the lactate experiments to questions about the possibility of hypocalcemia. In addition, the creation of anxiety attacks by sodium lactate infusions has been found to be somewhat equivocal.

No such theory has escaped criticism and controversy, and no chemical or peripheral theory has survived close scrutiny. In this chapter, relaxation will be defined as a primary state rather than as the opposite to or lack of anxiety.

DEFINITIONS OF RELAXATION AND ITS MEASURES

Benson (1975) has identified a relaxation response based on the original work of Hess. Hess (1954) described a trophotropic response that has characteristics similar to those identified with relaxation and that, he asserted, provides for protection and restitution. This particular response could be elicited by stimulation of anterior portions of the hypothalamus, and its opposite (the "fight-or-flight" response) could be elicited by stimulation of posterior areas within the hypothalamus. Thus, the trophotropic response is identified with parasympathetic nervous system effects and the opposite, or ergotropic, response with sympathetic nervous system effects. Benson postulates that these two responses, the hypometabolic and the hypermetabolic states, act in opposition, counteracting each other's effects.

In his pioneering work, Wolpe (1958) considered the sympathetic and parasympathetic subsystems of the autonomic nervous system. He postulated that these two subsystems were mutually antagonistic and, essen-

tially, mutually exclusive. Activation of the parasympathetic nervous system would, thus, reciprocally inhibit activity within the sympathetic nervous system, which Wolpe has identified as the "fight-or-flight" system.

Benson (1975) and others have listed the following physiological measurements of relaxation: oxygen consumption, respiratory rate, heart rate, alpha-wave activity in the brain, blood pressure, muscle tension, and galvanic skin conductance. It appears that the relaxation response, however elicited, is generally accompanied by signs of reductions in autonomic functions (Morse, Martin, Furst, & Dubin, 1977; Walrath & Hamilton,1975). However, a problem in comparing the results of various relaxation studies is the question of criterion measures of relaxation, or how a clinician knows when her or his client is relaxed (Luiselli, Marholin, Steinman, & Steinman, 1979). The reader is thus warned that conclusions reached in experimental studies about the efficacy of relaxation procedures for the treatment of psychological and somatic problems may depend crucially on operational definitions of relaxation involving one or more of the measures listed above.

THEORETICAL BASES FOR RELAXATION PROCEDURES IN BEHAVIORAL MEDICINE

Wolpe (1958) has postulated that activity of the parasympathetic nervous system stimulates decreases in activity of the sympathetic nervous system, and vice versa. According to this model, relaxation activates the parasympathetic nervous system, thus reciprocally inhibiting activity of the sympathetic nervous system. This can result in the counterconditioning or extinction of the fear or anxiety associated with sympathetic arousal.

The explanation above is, of course, oversimplified; there are regions served by the parasympathetic nervous system that might be identified with the fight-or-flight mechanism and vice versa. Since its original formulation, numerous other explanations for the reciprocal inhibition effect have been formulated (Goldfried & Davison, 1976).

Benson (1975) also postulated two antagonistic or mutually exclusive states, the hypometabolic and the hypermetabolic states. Different from Wolpe's model is the identification of these states as controlled by particular regions of the hypothalamus, with associated physiological changes. Thus, elicitation of the relaxation response is postulated to suppress the ergotropic, or fight-or-flight, response.

TYPES OF RELAXATION TRAINING

Relaxation training systems and methods can be conveniently divided into four major categories according to method of relaxation em-

ployed: physical relaxation, imaginal relaxation, biofeedback-assisted methods, and hypnosis. In each method, the desired outcome is a reduction in autonomic nervous system activity and, in particular, sympathetic nervous system activation. The experimental evidence presented below does not indicate a clear superiority of any method, and it may be advisable to choose the relaxation training procedure on the basis of convenience, time available for training, and previous familiarity of practitioner and client with any particular method.

Physical-Relaxation Techniques

The major system for physical relaxation is progressive muscular relaxation, as developed by Jacobson (1929, 1970, 1977). In this system, a patient is taught to recognize muscle tension and then trained to progressively relax muscle groups through successive tensing and relaxing. Jacobson describes a complete system based on progressive muscular relaxation; Bernstein and Borkovec (1973) report that, as of 1962, Jacobsonian relaxation involved 15 muscle groups.

During training, the client sits or reclines in a quiet, dimly lit room. Speaking in a slow and quiet manner, the therapist has the client successively tense and relax muscle groups: hands and forearms, biceps, wrists, forehead, eyes, mouth, neck (forward and backward), shoulders, chest, stomach, buttocks, thighs, calves, and feet. Two repetitions are done with each before moving on to the next muscle group. Clients should be instructed to close their eyes, if they can comfortably do so, before beginning; they should not strive for the greatest muscle tension possible. The therapist can determine whether sudden "letting go" of tense muscles is more advantageous than a slower relaxing of the muscle.

It may be advantageous to have the client read an elementary book about relaxation (Benson, 1975; Walker, 1975).

After practice twice daily with tapes of the therapist–client session, training in differential relaxation, or the selective relaxation of unused muscle groups while active, can proceed. The original Jacobsonian therapy is described as taking 1 or 2 hours per day, and Jacobson included differential relaxation in his original book (Jacobson, 1929). In a later presentation (Jacobson, 1970), two distinct methods of therapy were described: Progressive muscular relaxation and self-operations control. In self-operations control, the client is taught that muscular actions, particularly in the eyes, control thoughts. Thus, visualization is controlled by muscles of the eyes and auditory imagination by the muscles of speech. Jacobson does not employ direct suggestion. Extensive and original experimentation has been reported by Jacobson (1970). It is of interest to note that his experiments are in the tradition of physical science, employing direct measurement of action potentials by the integrating neurovoltmeter (Jacobson, 1970).

Wolpe (1958) employed a briefer version of progressive muscular relaxation in his application of the principle of reciprocal inhibition. A

patient might employ this briefer relaxation twice a day in 15-minute sessions. Both suggestions and conditioned responses (calming cues) are included in the Wolpian progressive muscular relaxation.

Imaginal-Relaxation Techniques

In imaginal-relaxation procedures, the patient employs mental imagery as a part of the relaxation process. This may well be the oldest relaxation procedure practiced by mankind; for our discussion, this subset of relaxation procedures includes autogenic training, sentic cycles, imagery, sensory awareness, meditation, and conditioned relaxation.

Autogenic Training

This comprehensive passive-relaxation technique was developed by Schultz and Luthe and represents a comprehensive system of treatment of disease in psychotherapy. Again, extensive experimental work, often European, is reported in the series of books (Luthe, 1969). This popular European relaxation training method includes six standard exercises (De Ropp, 1968): heaviness, warmth, cardiac regulation, respiration, abdominal warmth, and cooling of the forehead. It also includes seven meditative exercises: spontaneous experience of colors, experience of selected colors, visualization of concrete objects, visualization of abstract objects, experience of a selected state of feeling, visualization of other persons, and answers from the unconscious. This is a passive-, or nonmuscular-, relaxation system, and it requires considerable time to master in its full extent. There is an international society (ICAP) that accredits practitioners of autogenic methods and furnishes training for therapists.

The relationship between such a passive-relaxation method and self-hypnosis is close, and autogenic training can perhaps be considered as a special case of self-hypnosis (Weitzenhoffer, 1957).

Sentic Cycles

In a presentation prepared to illustrate progress toward scientific measurement of emotional states (for inclusion in a biomedical engineering textbook) Clynes (1970) described a novel approach. A *sentic cycle* is composed of eight sentic states—no emotion, anger, hate, grief, love, sex, joy, and reverence—in sequence. The client thinks of a sentic state. On cuing from a click, the subject presses a finger key similar to that on a piano. Finger pressure on the key is the measure used. Clynes notes correlations between physiological measure and the various sentic states. Benson (1975) notes that changes consistent with elicitation of the relaxation response may accompany the sentic states of reverence, love, and grief.

Clynes (1970, p. 347) notes that "The state is very different from

hypnosis in that the subject is in full control all the time." He reports clear physiological changes that accompany the sentic states.

The Method of Imagery

In this relaxation method, the patient is asked to employ mental imagery (often visual) in order to induce a relaxed state. This method was described in Salter's early work (1941, 1961); he recommended involving motor imagery and included sensations (e.g., warmth, heaviness) similar to a portion of autogenic training. There is surprisingly little experimentation reported in the literature for this often-used method of relaxation, although Schacter (1976) discussed the relation of imagery to the hypnagogic state (the state between sleep and full awakening) and Petty (1978), in a recent dissertation, demonstrated that imagery is experienced as more vivid in a hypnotic state.

The Method of Sensory Awareness

This method is based on Charlotte Selver's classes (purportedly based on Elsa Grindler's work), as reported by her husband (Brooks, 1974). The method of sensory awareness is a total system of body awareness, not just imagery. It includes touching, visualization of self as other objects, and similar techniques. Through various exercises, including dissociation of self in imagery, the relaxation response can be elicited. Goldfried and Davison (1976, pp. 102–104) report a modified question technique for sensory awareness as a relaxation technique. In this interesting modification of sensory awareness, the questions are so formulated as to create images of dissociation (e.g., "Is it possible for you to be aware how close your breath comes to the back of your eyes every time you inhale?").

Meditation

Many, and perhaps all, meditative techniques have been employed for relaxation and calming of the mind and body. These include transcendental meditation (TM), Zen, Yoga, and Gurdjieffian meditation. Benson (1975) has reported on the use of transcendental meditation, Zen, and Yoga; Smith (1975) has studied relaxation effects of Yoga meditation; and De Ropp (1968) describes a simplified Gurdjieffian system.

Recently, a detailed study of meditation has discussed many aspects, including client characteristics and therapist characteristics likely to yield success (Shapiro, 1980). Perhaps most important is the conclusion in this and other studies that among meditation, hypnosis, and other relaxation methods there is little difference in results, measured either objectively (physiologically) or subjectively (Morse et al., 1977; Shapiro, 1980; Walrath & Hamilton, 1975).

Benson et al. (1977) have reported a simple, four element procedure

for eliciting the relaxation response that does not require meditative training. In an experiment in an industrial setting (Peters, Benson, & Porter, 1977; Peters, Benson, & Peters, 1977), two 15-minute relaxation breaks daily were sufficient to positively affect self-report indices and reduce blood pressure.

The relation of meditation to left brain–right brain activity has been investigated and conjectured on by Ornstein (1972), Bogen (1969, a and b), and Bogen & Bogen (1969). It is believed that meditation accesses the nondominant hemisphere and might, in time, provide a "bridge" between hemispheric activities visually labeled as "linear, objective" and "gestalt, whole" (Bogen & Bogen, 1969).

Conditioned Relaxation

Bernstein and Borkovec (1973) report the use of a "calming cue" that is conditioned to a relaxed state. The patient repeats the word *calm* at the pause between inhalation and exhalation, only while in a highly relaxed state. After conditioning to the relaxed state, the calming cue can then be employed in other circumstances to elicit a relaxation response.

Relaxation Employing Biofeedback

Brown (1974) has reported the use of biofeedback instrumentation in relaxation training. Response systems chosen for biofeedback include EMG on the frontalis muscle, EMG on muscles other than the frontalis, EEG, GSR, skin temperature, and blood pressure. Tarler-Benlolo (1978) reports that biofeedback relaxation is most often used with EMG feedback from the frontalis muscle. Generalizability of the relaxation of the frontalis muscle to other muscle groups has, however, been questioned (Wilkinson, 1977). The use of biofeedback in relaxation training involves essentially a conditioned relaxation response.

Relaxation Using Hypnosis

Relaxation via hypnosis includes the use of direct suggestion (Goldfried & Davison, 1976, pp. 104–110), conditioned relaxation responses (Todd & Kelley, 1976), and autohypnosis (Benson, 1975; Haley, 1967). Goldfried and Davison (1976) report that hypnosis may be appropriate, at least in the initial states, for patients who experience difficulty in relaxing using any of the other methods reported above.

The possible relation between hypnosis and other relaxation methods has already been noted (Weitzenhoffer, 1957). At present, there is little evidence that hypnosis, meditation, and other relaxation procedures differ significantly in their results (Morse *et al.*, 1977; Shapiro, 1980).

APPLICATIONS AND EXPERIMENTAL EVIDENCE

Relaxation training and relaxation procedures have been applied in the treatment of anxiety states, hypertension, migraine headaches, chronic tension headaches, and as a component of Wolpe's (1958) psychotherapeutic method of systematic desensitization.

Paul (1969) compared brief progressive muscular relaxation (PMR) and hypnosis with a control group. There were 60 female subjects in three groups: brief PMR, hypnosis (hypnotic imagery), and a self-relaxation control group. Four physiological measures were employed: forearm muscle tension, heart rate, respiratory rate, and skin conductance. A self-report anxiety scale (Anxiety Differential) was the outcome measure. Results reported included the following:

1. Both hypnotic suggestion and abbreviated PMR do produce decreased physiological arousal and subjective distress within one to two sessions.
2. PMR is more effective than hypnotic suggestion in producing desired physiological changes, whether considered in terms of efficiency, intensity, or extent.
3. Galvanic skin conductance (GSC) was not a significant physiological measure.

Mathews and Gelder (1969) compared relaxation and control groups. Their first investigation compared a group using brief PMR with a control group. There were 10 subjects, and physiological measures included electromyogram (EMG) on the forearm, forearm blood flow, and skin conductance. Subjective anxiety measures employed were the Manifest Anxiety Scale, and the N scale on the Eysenck Personality Inventory. They reported no significant treatment effects.

In a second investigation employing a crossover design and 14 subjects, three new physiological measures were employed: frontalis EMG, heart rate, and respiration rate. The subjective measure employed was a psychiatric outpatient mood scale. They reported that the relaxation subjects showed a lower level of frontalis EMG activity, a lower frequency of skin conductance activity, and a greater decrease in skin conductance level. Heart and respiration rate were not significantly lower. No significant difference on the subjective measure was obtained. The relaxation subjects reported more relaxation.

Smith (1975) reported a study comparing meditation and yoga with an exercise control group. There were 95 psychoneurotic subjects (Bombay, India), and subjective measures included the MMPI, Rorschach, Taylor Manifest Anxiety Scale (MAS), a daily notebook, and blind clinical assessment. Smith reported that 73% of the subjects in the meditation and yoga group showed significant improvement versus 42% in the control group. The active group showed significantly reduced MAS and

greater overall MMPI improvement. Also, the better relaxers among the subjects did better, within the active group.

Sloan (1978) compared autogenic feedback relaxation versus EMG feedback relaxation versus attention-placebo control versus a no-treatment control group. There were 20 migraine sufferers as subjects, and measures included four physiological measures, one state anxiety score, and four indicators of headache activity. It was reported that EMG feedback assisted relaxation-lowered EMG frontalis more than autogenic-feedback relaxation. This did not result, however, in decreased migraine headache activity.

Petty (1978) studied the effects of hypnosis on visual imagery; he also compared hypnosis with visual imagery to PMR with a reclining control group. Results reported include the following: hypnosis enhanced visual imagery at medium and low levels of potential; hypnosis was superior to PMR and the control group; and anxiety reduction in each treatment was very small.

Snow (1978) compared Jacobsonian PMR, cognitive calmness, muscle focus plus cognitive calmness (Wolpean PMR), and self-relaxation. Measures included subjective anxiety, heart rate, and skin conductance level. Results reported were minimal differences among treatment groups and demand conditions.

Masur (1977) compared EMG biofeedback, PMR, and attention-placebo groups in the treatment of chronic tension headache. In this study, there was no significant difference between groups in the amount of headache reductions. There was, however, a significant decrease in headache activity for all three groups.

Detrick (1978) compared EMG biofeedback-assisted PMR, peripheral skin temperature feedback-assisted autogenic training, attention-placebo control, and no-treatment control in the treatment of tension headaches. In this study, there were 20 subjects with five per group. Results reported were that EMG biofeedback-assisted PMR significantly lowered headache activity, EMG levels, and self-reports of anxiety relative to both control groups. The autogenic group did not.

Tarler-Benlolo (1978) reviewed the role of relaxation in biofeedback training. In this comprehensive study, 85 papers were reviewed. Major conclusions include the following

1. Agreement that a physiologically identifiable relaxation state does exist. This can be described as a hypometabolic state of decreased sympathetic nervous system activity.
2. No conclusions about the superiority of biofeedback versus relaxation exercises in reducing EMG levels could be made, due to conflicting results.
3. Lack of standardization in the procedures for both biofeedback and relaxation hamper efforts at drawing conclusions about relative effectiveness.

4. Present evidence yields low or negative correlations between subjective reports of relaxed feelings and physiological measures of relaxation.

5. A combination of relaxation and biofeedback may provide the patient with optimum treatment. The best form of relaxation or biofeedback training is not yet determined.

6. Techniques involving passive relaxation appear to be currently favored. The most frequently used relaxation methods included progressive relaxation, autogenic training, and meditation.

Seer (1979) reviewed the psychological control of essential hypertension. Seer criticized the methodological quality of blood pressure biofeedback studies in comparison with relaxation–meditation studies. Little could be said as to which was the more effective technique. Although the experimental evidence is weak, it is reported that relaxation/meditation training produced small but significant reductions in blood pressure with essential hypertensives in contrast to blood pressure biofeedback methods.

DePiano and Salzberg (1979) reviewed the clinical applications of hypnosis to three psychosomatic disorders (skin disorders, headaches, and asthma). Thirty-eight studies were reviewed. Although weakly favorable results were reported in using hypnosis to directly affect physiological change and to alleviate symptoms, there were insufficient controls in the studies to establish a cause-and-effect relation between the hypnotic procedures and symptom alleviation.

Turk, Meichenbaum, and Berman (1979) reviewed biofeedback methods for the regulation of pain. They reported overall lack of consistent results in the biofeedback studies reviewed. The evidence at present for the use of biofeedback in reducing pain was considered marginal at best, resting on unmedical evidence and poorly controlled research.

Thus, although there is some evidence overall for the efficacy of relaxation methods in the treatment of both psychological and somatic complaints, there is not clear evidence of the superiority of one technique over another, and there is a lack of strong evidence of the efficacy of these methods overall. It can be hoped that future research will establish clear cause-and-effect relations between the various relaxation techniques and particular symptoms of distress.

REFERENCES

Ackerman, S. H., & Sachar, E. J. The lactate theory of anxiety: A review and reevaluation. *Psychosomatic Medicine*, 1974, *36*, 69–81.

Benson, H., Kotch, J. B., Crassweller, K. D., & Greenwood, M. M. Historical and clinical considerations of the relaxation response. *American Scientist*, 1977, *65*, 441–444.

Bernstein, D. A., & Borkovec, T. D. *Progressive relaxation training.* Champaign, Ill.: Research Press, 1973.

Bogen, J. E. The other side of the brain, I. *Bulletin of the Los Angeles Neurological Societies,* 1969, *34*(2), 73–105. (a)

Bogen, J. E. The other side of the brain, II. *Bulletin of the Los Angeles Neurological Societies,* 1969, *34*(3), 135–162. (b)

Bogen, J. E., & Bogen, G. M. The other side of the brain, III. *Bulletin of the Los Angeles Neurological Societies,* 1969, *34*(4), 191–220.

Brooks, C. V. W. *Sensory awareness: The rediscovery of experiencing.* New York: Viking, 1974.

Brown, B. B. *New mind, new body.* New York: Bantam, 1974.

Clynes, M. Toward a view of man. In M. Clynes & J. Milsum (Eds.), *Biomedical engineering systems.* New York: McGraw-Hill, 1970.

DePiano, F. A., & Salzberg, H. C. Clinical applications of hypnosis to three psychosomatic disorders. *Psychological Bulletin,* 1979, *86*(6), 1223–1235.

De Ropp, R. S. *The master game.* New York: Delta, 1968.

Detrick, P. F. Demonstration and comparison of EMG, biofeedback assisted relaxation versus autogenic feedback training for the treatment of tension headaches (Doctoral dissertation, University of Southern Mississippi, 1977). *Dissertation Abstracts International,* 1978, *38,* 5009-B. (Order no. 7802902)

Goldfried, M. R., & Davison, G. C. Relaxation training. *Clinical behavior therapy* (Chapter 5). New York: Holt, Rinehart & Winston, 1976.

Grosz, H. J., & Farmer, B. B. Blood lactate in the development of anxiety symptoms. *Archives of General Psychiatry,* 1969, *21,* 611–619.

Haley, J. (Ed.). Advanced techniques of hypnosis and therapy: In *Selected papers of Milton H. Erickson, M.D.* New York: Grune & Stratton, 1967.

Hess, W. R. *Diencephalon: Autonomic and extrapyramidal functions.* New York: Grune & Stratton, 1954.

Jacobson, E. *Progressive relaxation.* Chicago: The University of Chicago Press, 1929.

Jacobson, E. *Modern treatment of tense patients.* Springfield, Ill.: Charles C Thomas, 1970.

Jacobson, E. The origins and development of progressive relaxation. *Journal of Behavior Therapy and Experimental Psychiatry,* 1977, *8*(2), 119–123.

Luiselli, J. K., Marholin, D., Steinman, D. L., & Steinman, W. M. Assessing the effects of relaxation training. *Behavior Therapy,* 1979, *10,* 663–668.

Luthe, W. (Ed.). *Autogenic therapy* (6 vols.). New York: Grune & Stratton, 1969.

Masur, F. T. A comparison of EMG biofeedback, relaxation instructions, and attention-placebo in the treatment of chronic tension headaches (Doctoral dissertation, Saint Louis University, 1977). *Dissertation Abstracts International,* 1978, *38,* 4470-B. (Order no. 7800507)

Mathews, A. M., & Gelder, M. G. Psycho-physiological investigations of brief relaxation training. *Journal of Psychosomatic Research,* 1969, *13,* 1–12.

Morse, D. R., Martin, J. S., Furst, M. L., & Dubin, L. L. A physiological and subjective evaluation of meditation, hypnosis, and relaxation. *Psychosomatic Medicine,* 1977, *39*(5), 304–324.

Ornstein, R. E. *The psychology of consciousness.* San Francisco: W. H. Freeman, 1972.

Paul, G. L. Physiological effects of relaxation training and hypnotic suggestion. *Journal of Abnormal Psychology,* 1969, *74*(4), 425–437.

Peters, R. K., Benson, H., & Peters, J. M. Daily relaxation breaks in a working population: II. Effects on blood pressure. *American Journal of Public Health,* 1977, *67*(10), 954–959.

Peters, R. K., Benson, H., & Porter, D. Daily relaxation response breaks in a working population: I. Effects on self-reported measures of health, performance, and well-being. *American Journal of Public Health,* 1977, *67*(10), 946–953.

Petty, G. L. The effects of hypnosis on visual imagery (Doctoral dissertation, East Texas State University, 1977). *Dissertation Abstracts International,* 1978, *38,* 5586-B–5587-B. (Order no. 7805472)

Pitts, F. M., & McClure, J. N. Lactate metabolism in anxiety neurosis. *New England Journal of Medicine,* 1967, *277,* 1329–1336.

Salter, A. Three techniques of autohypnosis. *Journal of General Psychology*, 1941, *24*, 423–438.

Salter, A. *Conditioned reflex therapy* (2nd ed.). New York: Capricorn Books, 1961 (First edition, New York: Creative Age, 1949).

Schacter, D. L. The hypnagogic state: A critical review of the literature. *Psychological Bulletin*, 1976, *83*(3), 452–481.

Schneider, A. M., & Tarshis, B. *An introduction to physiological psychology.* New York: Random House, 1975.

Seer, P. Psychological control of essential hypertension: Review of the literature and methodological critique. *Psychological Bulletin*, 1979, *86*(5), 1015–1043.

Shapiro, D. H., Jr. *Meditation: Self-regulation strategy and altered state of consciousness.* New York: Aldine, 1980.

Shapiro, D. H., Jr., & Walsh, R. N. (Eds.). *The science of meditation.* New York: Aldine, 1980.

Sloan, P. E. A comparison of the effectiveness of autogenic feedback training vs. electromyogram feedback assisted relaxation for the treatment of migraine headaches (Doctoral dissertation, University of Southern Mississippi, 1977). *Dissertation Abstracts International*, 1978, *38*, 5045-B. (Order no. 7802935)

Smith, J. C. Meditation as psychotherapy: A review of the literature. *Psychological Bulletin*, 1975, *82*(4), 558–564.

Snow, W. G. The physiological and subjective effects of several brief relaxation training procedures (Doctoral dissertation, York University, 1977). *Dissertation Abstracts International*, 1978, *38*, 3417-B.

Tarler-Benlolo, L. The role of relaxation in biofeedback training: A critical review of the literature. *Psychological Bulletin*, 1978, *85*(4), 727–755.

Todd, F. J., & Kelley, R. J. The use of hypnosis to facilitate conditioned relaxation responses: A report of three cases. In E. Dengrove (Ed.), *Hypnosis and behavior therapy.* Springfield, Ill.: Charles C Thomas, 1976.

Toller, C. V. *The nervous body.* New York: Wiley, 1979.

Turk, D. C., Meichenbaum, D. H., & Berman, W. H. Application of biofeedback for the regulation of pain: A critical review. *Psychological Bulletin*, 1979, *86*(6), 1322–1338.

Walker, C. E. *Learn to relax: 13 ways to reduce tension.* New York: Prentice-Hall, 1975.

Walrath, L. C., & Hamilton, D. W. Autonomic correlates of meditation and hypnosis. *American Journal of Clinical Hypnosis*, 1975, *17*(3), 190–197.

Watson, J. B. *Behaviorism* (rev. ed.). Chicago: The University of Chicago Press, 1930.

Weitzenhoffer, A. M. *General techniques of hypnotism.* New York: Grune & Stratton, 1957.

Wilkinson, M. A critical view of the current use of electromyographic biofeedback in general relaxation training. *Canadian Counsellor*, 1977, *11*(4), 182–184.

Wolpe, J. *Psychotherapy by reciprocal inhibition.* Stanford: Stanford University Press, 1958.

Biofeedback
Clinical and Research Considerations

FRANK ANDRASIK, DAVE COLEMAN, AND
LEONARD H. EPSTEIN

INTRODUCTION

Background

Biofeedback is one of the major treatment technologies in behavioral medicine. In fact, the initial use of the term behavioral medicine was in reference to the use of bioteedback in the treatment of medical disorders (Birk, 1973). Although many other techniques have been used in the behavioral treatment of numerous disorders, a large proportion of the behavioral medicine literature involves biofeedback. In fact, previous reviews of the literature of behavioral medicine have separated the treatment literature into biofeedback (Blanchard & Epstein, 1977) and nonbiofeedback (Epstein, Katz, & Zlutnick, 1979) studies.

Biofeedback has gained great popularity partly because of the initial effects that the application of behavioral procedures had on physiological processes. Originally, many biofeedback studies suggested that the procedures used were derived from operant conditioning techniques (see Chapter 2). More recently, many and varied theories have been developed

First authorship is shared equally by the first two authors. Order of listing is alphabetic.

FRANK ANDRASIK • Department of Psychology, State University of New York, Albany, New York 12222.   DAVE COLEMAN • University of Maryland, Munich Campus, APO New York 09407.   LEONARD H. EPSTEIN • Department of Psychiatry, University of Pittsburgh School of Medicine, Western Psychiatric Institute and Clinic, 3811 O'Hara Street, Pittsburgh, Pennsylvania 15261.

that expand the basic operant reinforcement model (Brener, 1974) or suggest that non–learning models are more appropriate (Lang, 1975).

Biofeedback has been defined as follows:

> a process in which a person learns to reliably influence physiological responses of two kinds: either responses which are not ordinarily under voluntary control or responses which ordinarily are easily regulated but for which regulation has broken down due to trauma or disease. (Blanchard & Epstein, 1978, p. 2)

The process of biofeedback involves three operations. First, a biological response is detected and amplified. Second, the response is processed. And third, a form of the response is immediately fed back to the subject. The process of biofeedback can also be described in systems analysis terms. The use of the equipment and subsequent regulation of the physiological response represents a closed-loop feedback system. A person generates a response that is detected, amplified, processed, and then fed back to him or her as a new input. The observation of this input is then used to effect a change in the physiological response, which is detected, amplified, and fed back again as a new input, and so forth.

Scope of Application

Case reports of the successful application of biofeedback began to appear in the late 1960s. Since that time, clinical application of biofeedback has continued to grow in popularity at an ever-increasing rate. This phenomenon led Birk (1973) to state that "a new behavioral medicine, biofeedback, . . . may in fact represent a major new developing frontier of clinical medicine and psychiatry" (p. 2). A recent survey (Feuerstein & Schwartz, 1977), completed by 64% of the directors of APA-approved programs in clinical psychology, further documents the continued growth of an interest in biofeedback for 69% of the respondents indicated the existence of training in clinical psychophysiology; another 17% reported an interest in developing such training.

Recently, the authors surveyed the existing literature to identify the various disorders that have been treated by biofeedback and to further identify the various biofeedback procedures by which these disorders have been treated (see Table I). Inspection of Table I reveals that biofeedback has been applied to a wide variety of clinical disorders and that, in most cases, a given disorder has been treated by more than one biofeedback procedure. In preparing this table, the authors attempted to select the most representative research reports. With many disorders, however, very limited research is available. Further, the research available is often of low experimental quality (i.e., uncontrolled single-case and group studies). Therefore, many of the applications are listed not for their proven clinical utility but rather to acquaint the reader with the wide range of approaches and to identify applications that might have future clinical utility.

TABLE I. ILLUSTRATIVE BIOFEEDBACK APPLICATIONS

Disorder	Biofeedback procedure employed	Reference
Anxiety	Frontalis EMG biofeedback	Townsend, House, & Addario (1975)
Asthma	Frontalis EMG biofeedback	Kotses, Glaus, Crawford, Edwards, & Scherr (1976)
Bruxism	Masseter EMG biofeedback	Mulhall & Todd (1975)
Cardiac neurosis	HR biofeedback (+ gradual hierarchy presentation)	Wickramasekera (1974)
Eczematous dermatitis	Hand temperature biofeedback (+ relaxation training)	Manuso (1977)
Essential blepharospasm	Electrooculogram biofeedback (+ massed practice & contingent shock)	Ballard, Doerr, & Varni (1972)
Essential hypertension	Forearm & frontalis EMG biofeedback (+ autogenic training)	Moeller & Love (1974)
	GSR biofeedback (+ meditation-relaxation training)	Patel (1973)
	Diastolic BP biofeedback	Elder, Ruiz, Deabler, & Dillenkoffer (1973)
	Systolic BP biofeedback	Kristt & Engel (1975)
Fecal incontinence	External sphincter pressure biofeedback	Engel, Nikoomanesh, & Schuster (1974)
Functional diarrhea	Bowel sounds biofeedback	Furman (1973)
Heart rhythm & rate disturbance	HR biofeedback	Engel & Bleecker (1974)
		Scott, Blanchard, Edmundson, & Young (1973)
		Weiss & Engel (1971)
Insomnia	Theta EEG biofeedback	Sittenfeld (1977)
Migraine headache	Temperature (absolute) biofeedback	Andreychuk & Skriver (1975)
	Temperature (differential) biofeedback	Sargent, Green, & Walters (1972)
	Temporal artery vasomotor biofeedback	Friar & Beatty (1976)
	Alpha EEG biofeedback	Andreychuk & Skriver (1975)
Muscle retaining to increase activity	EMG biofeedback (+ physical therapy)	Basmajian, Kukulka, Narayan, & Takebe (1975)
		Brundy, Korein, Levidow, Grynbaum, Lieberman, & Friedmann (1974)
		Booker, Rubow, & Coleman (1969)
Muscle retaining to decrease activity	EMG biofeedback	Amato, Hermsmeyer, & Kleinman (1973)
		Brudny, Grynbaum, & Korein (1974)

TABLE I (*continued*)

Disorder	Biofeedback procedure employed	Reference
Obsessive ruminations	Alpha EEG biofeedback	Mills & Solyom (1974)
Outpatient psychiatric	Alpha EEG biofeedback	Weber & Fehmi (1975)
	GSR Biofeedback	Toomin & Toomin (1975)
Penile tumescence	Erection biofeedback (+ contingent aversive sound)	Rosen (1974)
Raynaud's disease	Temperature (absolute) biofeedback (following relaxation training & autogenic imagery)	Surwit (1973)
	Temperature (differential) biofeedback	Blanchard & Haynes (1975)
	Vasomotor biofeedback	Schwartz (1972)
Seizure disorders	Alpha EEG biofeedback	Rouse, Peterson, & Shapiro (1974)
	Sensorimotor rhythm EEG biofeedback	Sterman (1973)
Stuttering	GSR biofeedback	Tamayo, Standley, & Treon (1973)
Tension headache	Alpha EEG biofeedback	McKenzie, Ehrisman, Montgomery, & Barnes (1974)
	Frontalis EMG biofeedback	Budzynski, Stoyva, Adler, & Mullaney (1973)
Vaginismus	Contraction pressure biofeedback	Varni (1973)
Writer's cramp	EMG biofeedback	Reavley (1975)

Chapter Overview

The present chapter is intended to familiarize the reader with (a) various physiological systems and their associated recording procedures, (b) basic considerations in establishing a biofeedback laboratory, (c) relevant parameters of the biofeedback procedures, (d) the present status of research with several disorders felt at this point to hold considerable promise for biofeedback, and (e) a discussion of future directions for research and application of biofeedback techniques.

MAJOR METHODS OF MEASURING THE VARIOUS PHYSIOLOGICAL SYSTEMS

The most frequently used techniques for measuring the major physiological response systems for which biofeedback has been employed include blood pressure (BP), electromyogram (EMG), finger temperature (FT), electroencephalogram (EEG), and heart rate (HR). Each response system will be discussed in turn noting the advantages and disadvantages.

Blood Pressure

At least 15% of adults in the United States have hypertension (Gordon & Devine, 1966). As a result, many biofeedback researchers have attempted to use biofeedback to train people to lower their blood pressures. Generally speaking, BP is the force created in the arteries as the blood meets resistance in the periphery. This resistance can come from a variety of sources, such as constricted arterioles, fatty deposits that have accumulated within the arteries, and "hardened" nonelastic arteries resulting from the common condition known as arteriosclerosis, to name only a few. Blood pressure varies with each contraction of the left ventricle, the portion of the heart from which oxygenated blood is pumped. This variation occurs between two extremes. The maximum or systolic pressure is associated with the contraction of ventricle, and the minimum or diastolic pressure is associated with the relaxation of the heart before the next beat. Typically BP is expressed in terms of both extremes, as systolic "over" diastolic in millimeters of mercury (mmHg), with normal BP being approximately 120/80 ± 10 mmHg.

Two different methods have been used for measuring BP. One relies on the detection of Korotkoff sounds that are produced by blood flowing through a partially occluded artery and that can be detected through a stethoscope or microphone. Procedurally, a pressure cuff is placed on a subject's arm and inflated until all blood flow is stopped. As pressure in the cuff is gradually reduced, blood begins to flow again, and is detected by the onset of Korotkoff sounds. The pressure at which these Korotkoff sounds begin is termed the systolic pressure. The pressure at which the sounds disappear (i.e., when the cuff no longer occludes the artery) is the diastolic pressure. In biofeedback of BP, the cuff is first inflated to a known pressure. By feeding back the presence or absence of a Korotkoff sound, one can provide beat-by-beat information regarding progress in raising or lowering BP. For example, feedback to lower systolic BP would be done as follows. Cuff pressure would be set just below the subject's baseline systolic BP. A Korotkoff sound following a pulse beat would indicate that the subject's BP was above cuff pressure; thus, no feedback would be provided in this trial. However, if, during a trial, no Korotkoff sound occurred, then feedback would be provided. Cuff pressure would be gradually lowered in subsequent trials to shape successively lower systolic BP.

The second method of assessing BP is called pulse wave velocity (PWV); and it is an old method (Bramwell & Hill, 1922) but has been used only recently in BP biofeedback (Steptoe, 1978). Pulse wave transit times are correlated with systolic BP (Obrist, Light, McCubbin, Hutcheson & Hoffer, 1979) but not diastolic BP. Though pulse wave transit times are often taken as a measure of blood pressure, they are two distinct procedures for assessing cardiovascular and vascular events. As Obrist *et al.* (1979) suggest, pulse transit times provide estimates of sympathetic in-

fluence on myocardial events. Transit time is obtained by measuring the
interval between the initiation of a pulse from the heart and the detection
of that pulse in the periphery, usually an arm or finger. Transit time (TT)
has been found to be inversely related to mean arterial (Steptoe, Smulyan,
& Gribbin, 1976) and systolic pressures (Obrist *et al.*, 1979). In providing
feedback for lowering BP using either PWV or TT, one obtains a measure
of the average PWV or TT during a resting baseline phase. Subsequent
PWVs or TTs are then compared with this resting level. Each PWV or TT
that exceeds the previously calculated baseline level triggers a feedback
signal indicating a reduction in TT.

Electromyogram

Electromyogram feedback has been used extensively with headache
clients, patients requiring muscle rehabilitation, and anxious patients
who need to learn how to relax. The basis for the electromyogram (EMG)
is the small electrochemical change (muscle action potential) that occurs
when a muscle contracts. When electrodes are placed along a muscle
fiber, the small electrical potentials associated with the ion exchange
across the membrane of the muscles can be detected. Surface electrodes,
placed on the skin, detect the electrical activity of all the many muscle
fibers located under the electrodes. Three electrodes are generally used,
two active and one ground. The electrical activity occurring beneath the
ground electrode is considered to be "noise" (i.e., irrelevant activity due
to the contraction of other muscles and perhaps interference coming from
electrical supplies) and is "subtracted out" through electronic circuitry.
Therefore, the signal that remains is the signal due to the summation of
muscle activity directly under the active electrodes. The resistance be-
tween the active electrodes and the ground must be low (5,000–10,000 Ω
Lippold, 1967). This low resistance can be achieved by scrubbing the skin
thoroughly with an abrasive cleaner and alcohol so as to remove oil build-
up and dead skin cells before attaching the electrodes.

Electromyographic activity can be displayed in at least three ways.
First, the raw EMG signal can be displayed. There is however, one dis-
tinct disadvantage to this. Because EMG is a high frequency response, it is
difficult to discriminate small changes in muscle activity. Consequently,
raw EMG signals are infrequently used for biofeedback work. A second
more frequently employed method for displaying EMG signals is to use
an average, or leaky, integrator (Shaw, 1967). This device provides an
average signal that is analogous to the raw signal in that changes in
amplitude and frequency are reflected in the integrated signal. The advan-
tage of the leaky integrator is that it provides a much smoother signal
with less variation from which to discriminate small changes in muscle
activity. Usually, average integrators can process the signal at a rapid rate
(using a short-time constant setting) thereby producing a signal similar to
the unintegrated signal, or the integrator can process the signal at a much
slower rate (longer time constant settings), so that only large variations in

the raw signal produce changes in the average signal. The slower rate settings are those typically employed in biofeedback. The third and final technique for displaying EMG signals is called cumulative integration. A cumulative integrator operates such that all the activity occurring in a certain period of time is added together. Since all activity is accumulated, this technique provides the best estimate of EMG level over time. Usually, a time interval of one second is used. Therefore, cumulative records can be converted to microvolt-seconds (the amount of electrical activity needed to be generated in one second to produce a certain amount of cumulative activity.).

Finger Temperature

Finger temperature feedback has been used extensively as a biofeedback technique. This technique measures blood flow in the finger. The main application of FT feedback has been with migraine headache patients, though it has also been used as a means for inducing a general relaxation of the body. The rationale for both applications of FT feedback is that arousal of the sympathetic nervous system produces vasoconstriction in the periphery. Thus, training clients to increase peripheral blood flow (as in their fingers) will teach them to "relax the sympathetic outflow" (Sargent, Green, & Walters, 1973) and thereby induce a general bodily relaxation.

There are two basic methods for monitoring FT. Both techniques involve the use of temperature-sensitive materials whose electrical conducting properties change (i.e., their resistances change with changes in temperature). These devices are placed in an electrical circuit that provides constant voltage. Changes in resistance of the circuit, which reflect changes in temperature, are monitored. One method employs a device called a *thermistor*, which is made of a semiconductor. The other method uses a *thermocouple*, which is composed of two different metals held in juxtaposition. In a thermocouple, as the temperature of one metal changes in relation to the other metal, an electrical voltage is set up such that electricity is more likely to flow in one direction than the other, thereby altering the resistance to electrical flow.

Many extraneous factors can influence the monitoring of FT, including outside temperature and the temperature of the monitoring room. If between-session changes or absolute temperature levels are being monitored, it is very important that the monitoring room temperature be maintained from one session to the next and that a sufficient adaptation phase be employed.

Electroencephalogram

A great deal of the early work in biofeedback employed the EEG Brown, 1970, 1971; Kamiya, 1968). In this early work, researchers were attempting to teach subjects to produce a particular frequency of EEG

TABLE II. MAJOR FREQUENCIES OF THE HUMAN EEG

Name	Frequency (Hz)	Associated state
Alpha	8–13	Relaxed alertness, especially with eyes closed
Beta	14–30	Mentally alert and "thinking"
Theta	4–7	Early stages of sleep
Delta	1–3	Deep sleep

known as the *alpha rhythm*, which was believed to be associated with a relaxed alertness. In recent years, EEG biofeedback has been used for another purpose. Sterman (1973) and his colleagues (Sterman & Friar, 1972) have attempted to train epileptic patients to produce another frequency of EEG known as the *sensorimotor rhythm*, which is believed to suppress seizure activity (see Chapter 10).

For the most part, the EEG represents the electrical activity of the cerebral cortex. It does not, however, represent the firing of specific neurons; rather, the EEG is an average signal from many cells. At times, there is a relatively synchronous firing of thousands of cortical neurons that produces somewhat regular patterns in the EEG. The four major rhythms and the states associated with each are listed in Table II.

The bases of the methods used in monitoring the EEG are far too complex to be covered in depth here. Briefly, though, electronic circuitry using filters that allow only certain frequencies of electrical activity through are used. This activity can then be displayed directly or integrated in much the same manner as that described for EMG.

Heart Rate

As the supplier of blood to all life-maintaining organs of the body, the heart is the most important muscle of all. Consequently, it has been the focus of numerous biofeedback research efforts. One of two methodologies is generally used in measuring the activity of the heart: (1) electrocardiogram (EKG) or (2) tachygraphic analysis measurements based on the EKG. First, though, consider what the EKG measures. Just as in all muscles, the heart contracts (beats) through a biochemical process in which electrically charged elements (ions) are passed across the muscle membranes. As these charged particles move across the surface of the muscles, electrical potentials are generated because an "electrical equilibrium" has been momentarily disturbed, thereby causing an electrical current to flow. These electrical signals, in turn, are conducted through the body fluids to the surfaces of the body where recording electrodes can be attached so as to detect these minute changes in electrical current flow. Once these action potentials are amplified many times, a
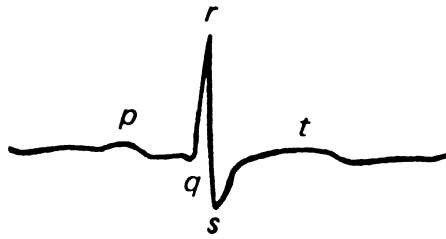
Figure 1. The waveform of the human electro-
cardiogram.

characteristic waveflow (see Figure 1) typifying the flow of electrical cur-
rent from the heart can be seen.

Three major components of the waveform can be identified: the P
wave which is associated with activity of the atrial portion of the heart
(receiving oxygen-deficient blood), the QRS complex associated with the
excitation of the ventricles (from which oxygenated blood is pumped
away from the heart), and the T wave associated with the return of the
ventricles to "electrical equilibrium." In the normal EKG, the R wave,
when recorded from electrodes on the right arm and left leg (i.e., diagon-
ally across the heart), has an amplitude of about 2 mV (Brener, 1967).

The EKG provides a considerable amount of information to a medi-
cally trained cardiologist, but much of it is unnecessary to a biofeedback
clinician who is primarily interested in heart rate changes. Consequently,
most biofeedback equipment uses a measurement that is a derivative of
the EKG, the cardiotachygraph. Through electronic circuitry, the car-
diotachygraph (tach) measures the length of time between two heartbeats
on two subsequent R waves. The tach provides an indication of HR in
beats per minute (BPM) based on the interbeat interval (IBI). For example,
if one second elapses between beats, the tach would indicate an HR of 60
BPM. The biofeedback clinician should keep in mind, however, that any
device employing cardiotachymeter circuitry provides the client with
information that is one beat behind his or her own heart beat because a
second beat must occur before an IBI can be determined.

SETTING UP A BIOFEEDBACK LABORATORY

Professionals interested in biofeedback are often overwhelmed by the
wide variety of biofeedback equipment that is now available. In an effort
to present a brief overall view of the various approaches to setting up a
biofeedback laboratory, the three most frequently used methods and the
advantages and disadvantages of each will be outlined briefly.

In setting up a biofeedback laboratory, there are three necessary steps
in providing feedback of a physiological response. First, the response
must be detected and transduced into electrical energy. Second, this elec-

trical signal must be amplified. Third, the amplified signal must be modified and quantified so as to provide comprehensible information to the client. These steps can be accomplished by three different methods.

The first method provides all three stages in one *self-contained unit.* Typically, these units are designed to provide feedback for only one particular response system. Thus, filters, time constants, amplifiers, and modifying logic are preadjusted to provide an optimal output signal for the response of interest. The advantages of this approach are twofold: (1) since many of the processing variables are preadjusted, the operation of these units is typically straightforward and requires minimal training; (2) often these units are quite compact and portable. The disadvantages include the following: (1) the operator typically has very little control over response characteristics (e.g., how fast an EMG signal is integrated, the filters used, etc.); (2) permanent records of the data are usually not available; and (3) troubleshooting must almost always be done at the factory or by a company representative.

The second approach accomplishes transduction and amplification of the response using a *polygraph.* Modification, quantification, and feedback of the response signal is provided by *solid-state programming modules.* This is the method most often used by researchers in biofeedback.

The advantages of this method are as follows: (1) the polygraph allows for the simultaneous recording of several physiological response systems, thereby allowing for comparison of changes that might occur concomitantly in various systems; (2) the operator has considerable control over how the signal is processed, and it can therefore be altered as the experimenter deems necessary; (3) the programming equipment provides versatility in both data quantification and feedback programming; and (4) a permanent record of the response is provided. Among the disadvantages are the following: (1) considerably more training is required for operation of the apparatus; (2) the method is expensive; and (3) the equipment is not portable.

In the third and final method, several types of *individual modules* are used to accomplish the necessary steps in biofeedback. Modules that provide for transduction and amplification of the physiological responses are interfaced with other modules that provide modification, quantification, and feedback abilities. The advantages of this approach include (1) considerable versatility in controlling response characteristics, (2) flexibility in data quantification and feedback delivery, and (3) less cost than the second approach with some of the same advantages. The disadvantages are (1) that no permenent record (e.g., physiological tracing) is usually available and (2) that the equipment lacks portability.

Calculations to determine the cost of establishing a laboratory that would enable the use to provide both EMG and thermal feedback were performed using each of the three methods. Results indicate that costs of a laboratory using self-contained units would be approximately $1,300,

for a polygraph with solid-state logic system, approximately $5,500, and for individual solid-state modules, approximately $2,100.[1]

In summary, each approach to setting up a laboratory has its advantages and disadvantages. In choosing one approach over another, one must consider the ultimate use of the information collected, the objectives (clinical use vs. research use), and the available financial resources.

CLINICAL APPLICATIONS OF BIOFEEDBACK

Research regarding specific disorders, essential hypertension, tension headaches, and migraine headache is critically analyzed in this section. The "state of the art" is most advanced for these disorders because sufficient controlled trials have been performed to permit one to draw valid conclusions regarding treatment efficacy. Whether or not the clinician decides to intervene in these or other disorders for which biofeedback has shown promise (e.g., seizure disorders, cardiac dysfunction, and stroke rehabilitation), medical knowledge is prerequisite. This, we feel, is important whether one selects biofeedback or other procedures. Further, we feel that any nonphysician practitioner who has responsibility for psychosomatic case management needs to maintain a close, collaborative relationship with a physician to avoid missing major underlying physical causes.

Applications reviewed in this section will be limited to controlled group outcome studies (Campbell & Stanley, 1966; Paul, 1969). In discussing the major findings, the following issues will be addressed: (1) evidence of ability to demonstrate self-control of the relevant response (i.e., demonstrate self-control and discrimination abilities; Epstein & Blanchard, 1977); (2) incorporation of controls for nonspecific or placebo effects; and (3) demonstrations of superiority over alternative treatment approaches.

Discussion of each disorder will contain four sections: (1) a brief description of the disorder; (2) the rationale for biofeedback as a treatment; (3) a review of the pertinent clinical applications; and (4) a brief summary of the relevant literature.

Tables have been constructed for each of the three disorders discussed and are contained in the subsequent sections. These tables contain a listing of the authors, sample sizes, descriptions of the experimental groups, and the obtained results. The various indices or dependent measures employed are categorized into pretreatment, posttreatment, and follow-up where available. Percentage improvement scores at posttreatment and follow-up are also included to provide a measure of the mag-

---

[1]Calculations as of March 1, 1979, were based on information supplied by four representative biofeedback equipment companies. Specifics of these calculations can be obtained by writing Dave Coleman, Department of Psychology, University of Georgia, Athens, Georgia 30602.

nitude of clinical-symptom improvement. These improvement scores were computed by the following formula:

$$\frac{\text{Pretreatment index} - \text{Posttreatment index (or Follow-up index)}}{\text{Pretreatment index}} \times 100\%$$

The number of subjects available at the time of follow-up as well as the length of time between the end of treatment and the beginning of follow-up are also reported. In preparing these tables, many of the indices were not readily available and had to be estimated from figures, tables, or text. In some cases, posttreatment indices were not calculated following the completion of treatment. In these cases, data from the last two weeks of treatment served as the posttreatment measures. In the case of multiple data points for an assessment period, 2 weeks were selected to represent the entire period.

Essential Hypertension

Description of the Disorder

Hypertension, or high blood pressure, is divided into two forms— primary, or essential, and secondary. In essential hypertension, no cause can be established. Secondary hypertension, on the other hand, is due to an underlying organic state such as chronic nephritis or tumor of the adrenal cortex. In cases such as these, the organic pathology is considered to be responsible for the blood pressure elevations. Criteria for the diagnosis of hypertension vary somewhat. Most investigators have considered as essential hypertensive those individuals having an arterial pressure greater than 140/90 mmHg with no known organic cause.

Rationale for Biofeedback as a Treatment

Hypertension is diagnosed solely on the basis of objective measurement. The treatment rationale, therefore, has been straightforward and has consisted (largely) of providing subjects with biofeedback regarding their blood pressure (BP) indices. Other forms of biofeedback, with less sound treatment rationales, have been attempted as well. These have basically consisted of EMG and GSR feedback. These treatments assume that regulation of muscle and electrodermal activity will produce reductions in BP as well. A more detailed description of hypertension and its treatment appear in Chapter 8.

Clinical Applications

Prototypical Example.   The first clinical application of BP feedback with hypertensives was performed by Benson, Shapiro, Tursky, and

Schwartz (1971). Seven patients were selected. All were stabilized on antihypertensive medication prior to initiation of treatment. Systolic BP was recorded during baseline; subjects remained in baseline until their systolic BP remained at a stable level for five consecutive sessions. Feedback was provided by the "automated constant cuff-pressure system" developed by Shapiro, Tursky, Gershon, and Stern (1969) and Tursky, Shapiro, and Schwartz (1972). Each subject received BP biofeedback to lower systolic BP. As in baseline, treatment sessions varied from subject to subject. Biofeedback continued until subjects were able to show no further BP decreases over five consecutive sessions. Baseline and treatment averaged 11 and 22 sessions, respectively. Treatment produced reductions on the average of 16.5 mmHg. Inspection of individual data revealed that five of the seven subjects showed marked decreases (16 mmHg or greater) in BP. Two of the subjects were able to reduce their BP to within the normal range.

Controlled Group Outcome Investigations. The initial success with BP biofeedback spawned additional basic and clinical BP research. Although success was reported in a number of other studies, less dramatic findings resulted in subsequent replications. Researchers have recently begun to undertake well-controlled multigroup trials. To date, seven such studies have been reported; five of these concern direct BP feedback, and two consist of other or indirect feedback. The essential features and results are presented in Table III.

Elder, Ruiz, Deabler, and Dillenkoffer (1973) performed the first multigroup outcome study and showed that BP feedback was successful in lowering diastolic BP—20% reductions were reported. Blood pressure in the no-treatment group remained unchanged. Since that time, no other BP feedback studies have been able to produce decreases of this magnitude. One other study that produced results similar to Elder *et al.* (1973) found BP feedback to be superior to a no-treatment control (Shoemaker & Tasto, 1975). Blanchard, Miller, Abel, Haynes, and Wicker (1979) examined effects and found that a group simply instructed to relax deeply achieved BP reductions similar to those achieved by BP feedback. These results, however, dissipated at follow-up.

Blood pressure biofeedback has been compared to a number of alternative treatment procedures. Relaxation was found to produce more consistent BP reductions than BP feedback in one investigation (Shoemaker & Tasto, 1975); a second study revealed BP feedback and a meditation relaxation procedure to produce similar improvement patterns (Hager & Surwit, 1978). Negative results for BP feedback and meditation relaxation have also been reported. Although Blanchard *et al.* (1979) were able to produce significant BP decrements in the laboratory, pre-post measurements conducted in a physician's office were nonsignificant for the BP feedback group. Surwit, Shapiro, and Good (1978) found neither of these procedures (or an EMG procedure) to be effective in reducing BP. Two of the studies investigating BP feedback have simultaneously inves-

TABLE III. SUMMARY OF CONTROLLED GROUP OUTCOME INVESTIGATIONS WITH ESSENTIAL HYPERTENSION

Authors	Number of subjects		Experimental groups	Pretreatment indices	Posttreatment		Follow-up			
	Total	In each condition			Indices	Improvement (%)	Improvement (%)	Indices	Number	Time Period
Elder, Ruiz, Deabler, & Dillenkoffer (1973)	18	E₁: 6	DBP biofeedback	SBP: 148.3" DBP: 107.5	140.9" 99.4	5.0 7.1	− 1.5 5.6	150.5 101.5	2	1 week
		E₂: 6	DBP biofeedback & contingent verbal approval	SBP: 153.7 DBP: 103.8	129.1 83.4	16.0 19.7	15.0 19.8	130.6 83.2	5	
		C: 6	Control	SBP: 150.0 DBP: 94.8	150.0 97.6	0.0 − 3.0	5.3 4.2	142.0 93.5		
Patel (1975)	40	E: 20	GSR biofeedback & meditation	SBP: 159.1 DBP: 101.1	138.7 85.9	12.8 15.0	9.2 14.2	144.4 86.7	20	12 months
		C: 20	No treatment	SBP: 163.1 DBP: 99.1	162.6 97.0	0.2 2.1	− 0.3 1.0	163.6 98.1		
Patel & North (1975)	34	E: 17	GSR biofeedback, EMG biofeedback & meditation	SBP: 167.5 DBP: 99.6	*b* *b*		15.6 15.3	141.4 84.4	17	3 months (every 2 weeks)
		C: 17	No treatment	SBP: 168.9 DBP: 100.6	*b* *b*		5.3 4.2	160.0 96.4	17	
Shoemaker & Tasto (1975)	15	E₁: 5	DBP & SBP biofeedback	SBP: 132.2 DBP: 89.8	132.8 88.6	− 0.05 1.3	Not collected			
		E₂: 5	Tape-recorded relaxation	SBP: 136.4 DBP: 90.4	129.6 82.8	5.0 8.4				

Study	N	Group	Treatment	Pretreatment			Posttreatment			Follow-up
Hager & Surwit (1978)	30	C: 5	Waiting-list control	SBP: 132.2 DBP: 90.4	133.8 91.6	-1.2 -1.3				
		E₁: 7	SBP biofeedback & home practice	SBP: " DBP: "						
		E₂: 10	Meditation-relaxation & home practice	SBP: " DBP: "						
Surwit, Shapiro, & Good (1978)	24	E₁: 8	SBP & HR biofeedback	SBP: 137.0[a]	137.0	0.0	138.0	-0.7	7	1 year
		E₂: 8	Forearm & forehead EMG biofeedback	SBP: 135.5[a]	134.0	1.1	148.0	-9.2	3	
		E₃: 8	Meditation relaxation	SBP: 142.5[a]	136.0	4.6	138.0	3.2	3	
Blanchard, Miller Abel, Haynes, & Wicker (1979)	28	E₁: 10	SBP biofeedback & home practice	SBP: 147.0[a] DBP: 89.0[a]	138.9[a] 87.1[a]	5.5 2.1	139.0[a] 82.0[a]	5.4 7.9	9	4 months
		E₂: 9	Forehead EMG biofeedback & home practice	SBP: 148.0[a] DBP: 95.0	138.5[a] 96.2[a]	6.4 -1.3	150.0[a] 97.0[a]	-1.4 -2.1	7	
		C: 9	Self-instructional relaxation & home practice	SBP: 149.0 DBP: 88.0	150.4[a] 85.2[a]	-0.9 3.2	148.0 87.0	0.7 1.1		

Note: E = experimental group, C = control group, SBP = systolic blood pressure, DSP = diastolic blood pressure.
[a] Indices estimated from tables, figures, or text.
[b] Indices not provided.

tigated EMG feedback (Blanchard *et al.*, 1979; Surwit *et al.*, 1978). In neither case was EMG feedback effective.

Table III also contains descriptions of two studies conducted by Patel (1975; Patel & North, 1975) that employ non-BP feedback. To date, Patel and her co-workers have reported the most consistent and clinically meaningful reductions in BP. Participants in her treatment studies typically receive a combination of biofeedback (GSR or GSR plus EMG) and meditation. With such a combination, the relative contributions of biofeedback cannot be determined. Blanchard and Miller (1977), however, report Patel as indicating that biofeedback plays only a minor role in the treatment.

Summary

Recent findings from several relatively large-scale well-controlled group outcome investigations indicate an inconsistent pattern of improvement from BP biofeedback. At best, biofeedback has produced minimal reductions in BP. Blanchard *et al.* (1979) have calculated that risk of death, based on life insurance data, would be decreased approximately by 15% from the application of BP feedback at present. As pointed out by them, this appears insignificant when compared to the 67% reduction in mortality ratios achieved with antihypertensive medication.

At present, procedures relying chiefly on biofeedback appear to offer no distinct advantage in the treatment of hypertension. The work of Patel, which combines biofeedback and meditation, remains the most significant. However, if her clinical impressions become tested and confirmed, the contributions of biofeedback will likely be found to be minimal.

Although most treatment studies have performed self-control assessments, no published outcome study has tested for discrimination. Even if the studies had shown consistent abilities to lower BP, there is no assurance that subjects would be able to discriminate the times at which to apply the strategies learned.

Tension Headache

Description of the Disorder

Tension headache is the most commonly occurring form of headache (Ad Hoc Committee on Classification of Headache, 1962). Tension headaches are characterized by viselike and/or bandlike bilateral head pain that is gradual in onset. The origin of the pain is believed to be due to sustained muscle contractions about the neck, shoulders, facial, and supraorbital regions, often occurring during stressful situations. However, as Bakal (1975), Philips (1977a, 1978), and others have pointed out, the exact etiology of tension headache remains undetermined.

Rationale for Biofeedback as a Treatment

Biofeedback treatment for tension headache has focused almost exclusively on modifying EMG tension levels. The treatment rationale here is clear and direct. Since tension headaches are assumed to be due to elevated muscle tension levels, treatment should be directed at lowering these abnormally high tension levels.

Clinical Applications

Prototypical Example.   Pioneering work with this disorder was performed by Budzynski, Stoyva, and their colleagues. Prior to clinical application, Budzynski and Stoyva (1969) set out to test whether forehead EMG activity could be reliably controlled. Correct EMG feedback was found to do this and to be superior to incorrect feedback or instructions to relax. Budzynski, Stoyva, and Adler (1970) then piloted EMG biofeedback on five tension headache sufferers. Prior to treatment, two sessions were devoted to baseline measurement. EMG levels were monitored from forehead electrode placements. At the third session, subjects began to receive biofeedback training. Feedback consisted of providing a continuous tone whose pitch varied according to the level of muscle tension present. Low-pitched tones indicated relative muscle relaxation; subjects were instructed to keep the tone low in pitch. The gain of the feedback loop was steadily increased over time to shape successively lower muscle tension levels. Subjects received two to three 30-minute feedback sessions per week. The duration of treatment varied from 5 to 12 weeks. As subjects become increasingly proficient at relaxing forehead muscle tension, "silent" trials were interspersed among the feedback trials to facilitate transfer of training. All subjects were encouraged to practice relaxation training daily at home.

Results indicated that subjects were able to reduce their forehead muscle tension levels while feedback was provided. Self-reported headache intensity was found to significantly decrease as a function of this training. These results were mostly maintained at 3-month follow-up evaluations.

Controlled Group Outcome Investigations.   Budzynski, Stoyva, Adler, and Mullaney (1973) performed the first controlled group outcome study (see Table IV). This study compared a contingent EMG biofeedback procedure (from participant's forehead muscle) to both a noncontingent EMG biofeedback group and a no-treatment control group. The use of a noncontingent EMG biofeedback procedure was included in an attempt to rule out "placebo or suggestion effects." After treatment, mean EMG levels for the contingent biofeedback group were significantly lower than those for the noncontingent group, demonstrating feedback control. Subjects in the contingent EMG biofeedback group reported significant reductions in headache that were maintained at 3- and 18-month follow-ups.

TABLE IV. SUMMARY OF CONTROLLED GROUP OUTCOME INVESTIGATIONS WITH TENSION HEADACHE

Authors	Number of subjects		Experimental groups	Pretreatment indices	Posttreatment		Follow-up			
	Total	In each condition			Indices	Improvement (%)	Indices	Improvement (%)	Number	Time period
Budzynski, Stoyva, Adler, & Mullaney (1973)	18	E₁: 6	Forehead EMG biofeedback & home practice	HA: 0.5"	0.2"	60	0.1"	80	6	3 months (& 1½ years for 4 subjects in E₁)
		E₂: 6	Pseudo-EMG biofeedback & home practice	HA: 0.7"	0.6"	14	0.5"	29	6	
		C: 6	No treatment	HA: 0.7"	0.7"	0		Not collected		
Cox, Freundlich, & Meyer (1975)	27	E₁: 9	Forehead EMG biofeedback, cue-controlled breathing & home practice	HA: 1.7 F: 18.4 D: 94.7	0.6 9.1 33.0	65 51 65	0.6 7.8 31.3	65 58 67	8	4 months
		E₂: 9	Deep muscle relaxation, cue-controlled breathing & home practice	HA: 1.4 F: 16.6 D: 79.7	0.6 7.9 37.2	57 52 53	0.5 8.0 28.4	64 52 64	8	
		C: 9	Medication Placebo	HA: 1.6 F: 17.8 D: 84.4	1.3 13.9 68.3	19 22 19	0.9 14.4 37.6	44 19 59	8	
Haynes, Griffin, Mooney, & Parise (1975)	21	E₁: 8	Forehead EMG biofeedback	HA: 82.1 F: 5.5 D: 4.7 I: 3.4	20.9 1.5 2.9 1.7	75 73 38 50	11.4 1.2 2.3 4.1	86 78 51 -21	6	5–7 months

	E₂: 8	Taped relaxation instructions	HA: 102.3	18.6	82	0.5	100	6
			F: 5.2	1.4	73	0.3	94	
			D: 5.7	3.6	37	0.4	93	
			I: 3.6	2.0	44	2.0	44	
	C: 5	No treatment	HA: 68.7	87.8	−28	48.3	30	4
			F: 6.1	5.5	10	4.7	23	
			D: 2.5	3.1	−24	1.7	32	
			I: 4.2	4.0	5	6.0	−43	
Chesney & Shelton (1976)	24							
	E₁: 6	Forehead EMG biofeedback	F: 4.8	2.8	42		Not collected	
			D: 5.3	6.3	−19			
			S: 52.3	32.5	38			
	E₂: 6	Deep muscle relaxation & home practice (relaxation tape)	F: 5.3	1.3	75			
			D: 5.3	2.5	53			
			S: 42.8	22.6	47			
	E₃: 6	Forehead EMG biofeedback, deep muscle relaxation & home practice (relaxation tape)	F: 5.8	1.3	78			
			D: 6.3	1.6	75			
			S: 48.3	15.3	68			
	C: 6	No treatment	F: 4.2	4.7	−12			
			D: 4.6	4.5	2			
			S: 37.1	44.6	−20			
Hutchings & Reinking (1976)	18							
	E₁: 6	Forehead EMG biofeedback & home practice	HA: 10.0"	3.0"	70		Not collected	
	E₂: 6	Deep muscle relaxation, autogenic training (both via tape recording) & home practice	HA: 15.0"	11.0"	27			

TABLE IV (continued)

Authors	Total	In each condition	Experimental groups	Pretreatment indices	Posttreatment Indices	Posttreatment Improvement (%)	Follow-up Indices	Follow-up Improvement (%)	Follow-up Number	Time period
		E₃: 6	Forehead EMG, deep muscle relaxation, autogenic training & home practice	HA: 13.0"	4.0ᵃ	70				15 weeks
Holroyd, Andrasik, & Westbrook (1977)	31	E₁: 11	Forehead EMG biofeedback, home practice, & counterdemand instructions	HA: 102.3 F: 5.7 D: 25.5 I: 3.9	76.0 3.7 14.0 3.8	26 35 45 3	74.9 3.1 16.7 4.0	27 46 35 - 3	10	15 weeks
		E₂: 10	Stress-coping training & counterdemand instructions	HA: 92.5 F: 5.3 D: 20.6 I: 4.4	25.4 2.5 7.9 2.6	73 53 62 41	21.6 1.6 6.1 2.2	77 70 70 50	9	
		C: 10	Waiting-list control	HA: 95.1 F: 5.7 D: 22.2 I: 4.2	100.8 5.0 22.5 4.1	- 6 12 - 1 2	95.6 4.7 21.2 4.0	- 1 18 5 5	9	
Kondo & Canter (1977)	20	E₁: 10	Forehead EMG biofeedback	F: 5.3"	1.0"	81	ᵇ		5	12 months
		C: 10	Pseudo-EMG biofeedback	F: 5.0"	3.5"	30	ᵇ		5	
Philips (1977b)	15	E₁: 8	Forehead or temporal EMG biofeedback	F: 5.4 I: 1.1	3.8 0.8	30 27	3.8 0.5	30 56	5	6–8 weeks

Study	N	Group	Treatment								Duration
		C: 7	Pseudo-EMG biofeedback	F: 3.8	3.2	16	2.6	32		3	
				I: 0.6	0.4	33	0.6	0			
Andrasik & Holroyd (1980)	39	E₁: 10	Forehead EMG decrease biofeedback	HA: 149.3	28.0	81	32.6	78		10	6 weeks
				F: 8.1	3.0	63	4.0	51			
				D: 56.2	11.2	80	16.1	71			
				I: 2.5	1.3	48	1.6	36			
		C₁: 9	Forearm EMG decrease biofeedback	HA: 125.3	37.8	70	26.9	79		8	
				F: 9.3	3.5	62	3.3	65			
				D: 42.1	16.4	61	15.1	64			
				I: 2.9	2.1	28	2.0	31			
		C₂: 10	Forehead EMG increase biofeedback	HA: 141.7	52.8	63	43.8	69		10	
				F: 7.4	5.2	30	3.9	47			
				D: 48.3	25.0	48	20.4	58			
				I: 2.9	1.9	34	1.6	45			
		C₃: 10	Symptom monitoring	HA: 138.9	129.3	7	133.0	4		9	
				F: 8.6	6.5	24	6.1	29			
				D: 46.0	43.1	6	43.5	5			
				I: 2.9	2.9	0	2.9	0			
Holroyd, Andrasik, & Noble, (1980)	28	E₁: 8	Forehead EMG biofeedback & home practice	HA: 164.8	55.5	66	52.9	68		7	4 weeks
				F: 8.4	2.8	67	2.6	69			
				D: 49.3	20.2	59	20.8	58			
				I: 3.2	2.2	31	2.4	25			
		C₁: 9	Pseudotherapy & home practice	HA: 151.9	133.0	12	110.4	27		9	
				F: 7.2	4.9	32	4.4	39			
				D: 50.6	39.4	22	31.9	37			
				I: 3.0	3.1	-3	2.8	7			
		C₂: 11	Symptom monitoring	HA: 155.8	137.1	12	133.6	14		9	
				F: 7.3	6.2	15	5.3	27			
				D: 43.8	44.6	-2	46.0	-5			
				I: 3.5	3.2	9	3.5	0			

Note: E = experimental group, C = control group, HA = composite measure of headache activity, F = headache frequency, D = headache duration, I = headache intensity, S = headache severity.
[a] Indices estimated from tables, figures, or text.
[b] Indices not reported.

No improvement was reported in either of the other two groups. This study has generally been regarded as clearly demonstrating the specificity and efficacy of forehead muscle conditioning for tension headache.

Although Budzynski et al. (1973) are generally regarded as having clearly demonstrated the specificity and efficacy of forehead muscle conditioning for tension headache, Kondo and Canter (1977) questioned these findings because of the confounding of home relaxation practice with biofeedback training. In their study, tension headache sufferers were assigned to either a true or false (as in Budzynski et al., 1973) feedback procedure, both in the absence of home practice. Posttreatment and 12-month follow-up data revealed a significant reduction in headache frequency for the true-feedback group relative to the false-feedback group. Philips (1977b), too, found true feedback in the absence of home practice to be superior to false feedback in reducing headache intensity. Further support for the specificity of biofeedback is found in a study recently completed by Holroyd and one of the present authors (Holroyd, Andrasik, & Noble, 1980). This study compared biofeedback to a pseudotherapy procedure, rated by participants as equal in credibility to biofeedback, and a symptom-monitoring control group. The pseudotherapy condition involved training in "body awareness" and "mental control." On all measures of severity, the biofeedback group was shown to be superior to the symptom-monitoring group. The pseudotherapy procedure was not significantly different from either the biofeedback or the symptom-monitoring group.

Two recent group outcome investigations challenged the specificity of biofeedback for tension headache. Holroyd, Andrasik, and Westbrook (1977) assigned headache sufferers to one of three conditions: stress-coping training, forehead EMG biofeedback training, or waiting-list control. Both treatments were administered under "counterdemand instructions" (Steinmark & Borkovec, 1974) to minimize expectancies for improvement. Under these conditions, only participants receiving the stress-coping training reported significant headache reductions at the end of treatment and at follow-up. Although subjects in the EMG condition displayed significant pre- to posttreatment reductions in EMG levels and abilities to self-control forehead muscle tension, no headache reductions were found.

A subsequent study was designed to further test the relationship between the control of EMG activity and headache. In Andrasik and Holroyd (1980), headache sufferers received feedback for either increasing or decreasing frontalis muscle activity or feedback from an irrelevant muscle group (in order to have the forehead muscle tension remain at pretreatment levels). Although participants showed appropriate changes in muscle tension levels, all participants were led to believe they were learning to reduce EMG activity. All three groups showed substantial reductions in headache activity relative to a symptom-monitoring control group. These gains were essentially maintained at 6-week follow-up.

Several studies have compared EMG biofeedback to other treatment procedures. Most of these studies consist of comparisons with various relaxation training procedures. Two such studies have found EMG feedback and relaxation training equally effective (Cox, Freundlich, & Meyer, 1975; Haynes, Griffin, Mooney, & Parise, 1975) and both superior to control procedures for reducing headache symptomatology. Hutchings and Reinking (1976) found both an EMG and a combined EMG and verbal relaxation training procedure to be superior to relaxation training alone. Chesney and Shelton (1976) found contrasting results. These authors found both a combined procedure (relaxation and EMG training) and a muscle relaxation procedure to be superior to EMG training alone. Although the EMG group did not differ significantly from the no-treatment group at posttreatment, this group did show pre–post reductions. As previously stated, Holroyd *et al.* (1977) found a stress-coping procedure to be superior to EMG biofeedback.

Summary

Support for the specificity of EMG biofeedback training for tension headache is lacking (Andrasik & Holroyd, 1979). Although an ample number of studies have demonstrated self-control of muscle tension levels in headache sufferers, few investigators have been able to demonstrate a significant relationship between EMG levels and symptom improvement. In one study, significant reductions in EMG tension levels were not followed by symptom reduction (Holroyd *et al.*, 1977). Also, EMG conditioning in a direction opposite to that employed in previous studies that had demonstrated treatment effectiveness also resulted in significant symptom relief (Andrasik & Holroyd, 1980).

Controversy exists within the literature regarding the etiology of tension headaches. Some researchers have established minimum elevations of muscle tension levels as one of their selection criteria; most investigators have not. Future research should attend more closely to this dimension. However, most researchers who have investigated the relationship between forehead muscle tension and headache activity found minimal, if any, relationship.

A variety of relaxation procedures, as well as a stress-coping procedure, have been found to be equal or superior to EMG biofeedback for the treatment of tension headache. For this disorder, biofeedback appears to offer no distinct advantage to alternative procedures at present.

Migraine Headache

Description of the Disorder

Migraine is characterized by pulsating or throbbing unilateral head pain that is sudden in onset. The pain is assumed to be vascular in origin.

There are two major forms of migraine—classic and common. In classical migraine, a period of intense vasoconstriction precedes headache onset: sensory prodromata may result. In common migraine, the initial vasoconstriction is not always present. In either form, headache is the result of massive dilation of the extracranial vasculature and distension of surrounding pain-sensitive fibers.

Rationale for Biofeedback as a Treatment

The initial application of biofeedback to migraine resulted from a serendipitous laboratory finding when workers at the Menninger Clinic noticed a large increase of hand temperature in a migraine sufferer recovering from a headache attack. Experimentation revealed hand warming to be successful in aborting subsequent headaches. Several large-scale clinical trials were soon undertaken.

Clinical Applications

Prototypical Example.   Preliminary work was presented in Sargent, Green, and Walters (1972, 1973). Data from these and additional cases are described in Sargent, Walters, and Green (1973). The initial treatment procedure was a combination of temperature feedback and autogenic training, coupled with regular home practice with both. Peripheral skin temperature was monitored from two sites—fingertip and forehead. Subjects were presented feedback on the temperature differential. They were instructed to warm their hands relative to their foreheads. Autogenic training, originated by Schultz and Luthe (1969), was incorporated to facilitate the procedure. The autogenic component involved passive concentration on verbal phrases designed to induce heaviness in the limbs and warmth in the extremities.

Treatment sessions were held weekly. Subjects were given portable feedback devices to use in home practice. Over time, the temperature trainer was faded from home practice. At the end of treatment, temperature training was withdrawn. The subjects were then seen every 1–3 months for follow-up. Global clinical impressions were used to assess improvement in this initial work. Factors considered in this evaluation were headache intensity and the number and potency of analgesics used. In these initial reports, estimates of improvement ranged from 29 to 81%.

Although these early reports lacked certain important experimental controls, their significance for the field of biofeedback treatment was great. A number of other reports, both controlled and uncontrolled, began to proliferate. Portable temperature trainers became increasingly popular. Fortunately, several well-controlled group outcome studies have recently been completed. The effects of temperature training can thus be more critically evaluated.

Controlled Group Outcome Investigations.   Table V lists three multigroup investigations of temperature feedback. One study has shown

TABLE V. SUMMARY OF CONTROLLED GROUP OUTCOME INVESTIGATIONS WITH MIGRAINE HEADACHE

Authors	Number of subjects — Total	Number of subjects — In each condition	Experimental groups	Pretreatment indices	Posttreatment — Indices	Posttreatment — Improvement (%)	Follow-up — Indices	Follow-up — Improvement (%)	Follow-up — Number	Follow-up — Time period
Andreychuk & Skriver (1975)	28	E₁: 10	Self hypnosis & home practice	HA: 87.5[a]	55.1[a]	37.0	Not collected			
		E₂: 9	Hand temperature biofeedback & home practice	HA: 132.1[a]	24.1[a]	81.8				
		E₃: 9	Alpha EEG biofeedback & home practice	HA: 73.6[a]	40.4[a]	45.1				
Blanchard, Theobald, Williamson, Silver, & Brown (1978)	30	E₁: 10	Finger temperature biofeedback, autogenic training & home practice	HA: 0.75[a]	0.20[a]	73.3	0.28[a]	62.7	10	12 weeks
				F: 3.2[a]	1.4[a]	56.3	1.5[a]	53.1		
				PI: 3.6[a]	2.0[a]	44.4	2.0[a]	44.4		
				MPI: 3.1[a]	1.8[a]	41.9	1.5[a]	51.6		
				ED: 13.0[a]	7.0[a]	46.2	1.0[a]	92.3		
		E₂: 10	Deep muscle relaxation training & home practice	HA: 0.80[a]	0.15[a]	81.3	0.35[a]	45.0	9	
				F: 2.8[a]	0.9[a]	67.9	0.9[a]	67.9		
				PI: 3.4[a]	1.5[a]	55.9	2.0[a]	41.2		
				MPI: 2.8[a]	1.3[a]	53.6	2.0[a]	28.6		
				ED: 17.0[a]	5.5[a]	67.6	2.0[a]	88.2		
		C: 10	Waiting-list	HA: 0.85[a]	0.65[a]	23.5				
				F: 2.9[a]	1.6[a]	44.8				
				PI: 3.2[a]	2.8[a]	12.5				
				MPI: 2.6[a]	2.5[a]	3.8				
				ED: 14.0[a]	14.0[a]	0.0				
Mullinix, Norton, Hack, & Fishman (1978)	11	E: 6	Finger temperature biofeedback & home practice	I:[b]		21.2	Not collected			
		C: 5	Pseudo-temperature biofeedback	I:[b]		7.8	Not collected			

Note: E = experimental group, C = control group, HA = composite measure of headache activity, F = headache frequency, PI = headache peak intensity, MPI = headache mean peak intensity, ED = headache elevated duration, I = headache intensity.

[a]Indices estimated from tables, figures, or text.

[b]Indices not provided.

temperature feedback to be superior to no treatment (Blanchard, Theobald, Williamson, Silver, & Brown, 1978). Mullinix, Norton, Hack, and Fishman (1978) investigated the possible placebo effects of temperature feedback and concluded that placebo effects largely accounted for their observed treatment effects. Two studies have compared temperature feedback to other treatment approaches. Temperature feedback was found to produce no differential treatment superiority over relaxation (Blanchard et al., 1978) or alpha feedback or self-hypnosis (Andreychuk & Skriver, 1975). No study has investigated subjects' abilities to self-control temperature warming or to discriminate when to apply techniques. Mullinix et al. (1978) examined the relationship between amount of temperature warming and degree of improvement. No significant relationship was found. Only one study has reported follow-up results (Blanchard et al., 1978); initial results were essentially maintained.

Summary

Evidence exists indicating that the clinical application of hand temperature feedback does produce significant symptom reductions in migraine sufferers. However, the ingredients responsible for this effect are uncertain. Although Mullinix et al. (1978) state that the effect is largely placebo-produced, they present insufficient data to support such a strong conclusion. In their study, both groups of subjects were given temperature-warming feedback. One group received true feedback; the other received experimenter-controlled feedback that indicated progressive increments in hand warming. At the end of treatment, the authors reported that absolute temperatures were significantly higher for the true-feedback group. However, no comparisons were reported for the subjects' abilities to hand-warm prior to training and after training. It may be that both groups actually achieved significant increases in hand warming, with the true-feedback group simply producing more of an increase. To further evaluate this placebo specificity issue, information is needed on subjects' abilities to demonstrate self-regulation (self-control discrimination). This has yet to be done. The present data are consistent regarding differential treatment effectiveness. To date, temperature feedback has shown no differential treatment superiority when compared to relaxation training. Each procedure has produced similar decrements in migraine symptomatology. As migraine is due to excessive vasodilation, it is puzzling that either of these procedures "works," as both relaxation and hand warming produce vasodilation.

Lastly, there is very limited information on the long-term effects of temperature feedback. At this point, research has given no indication of why hand temperature training should influence vasomotor tone of the cranial blood vessels. Mediation by the sympathetic nervous system is suspected, but the exact mechanism is not known.

Investigators have recently begun to attempt headache control by

training subjects to control cephalic vasomotor activity. This procedure is more sound physiologically, because treatment is aimed at modifying the vasodilation occurring in migraine. It is assumed that training subjects to vasoconstrict would be helpful in relieving migraine pain. One controlled group outcome study has been performed by Friar and Beatty (1976). Subjects were given biofeedback training to control vasomotor activity at either a relevant site (forehead temporal artery) or an irrelevant site (hand). At the end of training, migraine incidence was reduced only for the subjects receiving forehead arterial vasomotor training. Several single-case experiments have recently appeared that also provide some support for this treatment procedure (Feuerstein & Adams, 1977; Sturgis, Tollison, & Adams, 1978). Further research is needed to determine whether this procedure offers any advantage over temperature feedback and other treatments.

DISCUSSION

For a number of years, reviewers of the research literature on biofeedback have cautioned against the uncritical use of biofeedback. For example, Blanchard and Young (1974) published a biofeedback review concluding that biofeedback produced strong treatment effects with only two clinical disorders: electromyogram feedback for muscle rehabilitation and tension headaches. Experimental research in cardiovascular and seizure disorders was described as "encouraging" but "subject to a variety of methodological flaws" (p. 573). They concluded that no firm statements could be made in other areas. Shapiro and Surwit (1976) echoed these words of caution, stating, "there is not one well-controlled scientific study of the effectiveness of biofeedback and operant conditioning in treating a physiological disorder" (p. 113). Our review in this chapter indicates that biofeedback has not been shown to be the superior treatment in any of the three responses examined. Similar conclusions have been reached by numerous other critical reviewers (Alexander & Smith, 1979; Blanchard & Epstein, 1977, 1978; Feuerstein & Schwartz, 1977; Lynn & Freedman, 1979; Miller & Dworkin, 1977). Thus. we must recommend extreme caution in the continued use of biofeedback.

For researchers in the area, it seems clear that the primary focus for future research must be on conducting the necessary controlled-outcome studies that will delineate the actual components of the biofeedback treatment package. Studies that isolate the effects of self-monitoring, expectations, repeated sessions, and attention-placebo considerations are sorely needed. A second possible direction for research is in the use of biofeedback training to obtain a particular physiological state so that the effects of that state on other physiological responses can be determined. An example of this kind of research was recently provided by Young, Langford, and Blanchard (1976), who demonstrated in one subject that

heart rate acceleration was directly related to blood levels of a substance
called *renin,* which helps regulate blood pressure.

First among our recommendations for clinicians working in the area
is a careful and appropriate assessment of the presenting disorder. Fre-
quently, EMG frontalis and thermal feedback are used for a variety of
"stress-related disorders," such as dermatitis, ulcers, and hypertension,
simply because the clinician has that particular mode of feedback avail-
able. These two types of feedback are employed independent of the under-
lying physiological disorder. Of course, to the extent that physiological
changes are due to subjects living in stressful environments, the way they
are taught to relax might not matter. For example, research comparing
biofeedback training with relaxation training for tension headaches (Cox
et al., 1975), migraine headaches (Blanchard *et al.,* 1978), and hyperten-
sion (Shoemaker & Tasto, 1975) has shown that both treatments produce
significant improvements in symptoms but that there is no difference
between the two approaches. Thus, perhaps the use of progressive muscle
relaxation (Bernstein & Borkovec, 1973) would be a more cost-efficient
technique that would also facilitate home practice. However, the dif-
ferences between biofeedback and relaxation may be more subtle. For
example, Steptoe (1978) has shown that both biofeedback and relaxation
training produce similar decreases in resting level but that biofeedback is
related to superior pulse transit time control during a stressor. Second,
from our clinical experience in using biofeedback, we would suggest that
clients be assisted in learning self-control of physiological responses by
having them verbalize the strategies and images used in producing
physiological changes observed during biofeedback training. The advan-
tage to this seems to be that clients can more easily re-create their images
and reproduce their strategies when the clinician reminds them of the
words used to describe previously "successful" experiences in biofeed-
back training. Finally, we recommend that clinicians assess the most
appropriate feedback mode to employ with individual patients. Several
options are often available for feedback presentation (e.g., binary vs.
analogue and auditory vs. visual, some of which are relaxation enhancing
to specific clients and irritating to others. Our clinical experience indi-
cates that some clients find they learn more easily with one mode of
biofeedback presentation than another. Only careful, individualized as-
sessment will suggest what mode is most appropriate for each client.

The final three suggestions for future directions in the area of
biofeedback are of relevance to both researchers and clinicians. First,
future research should focus on the identification of physiological
mediators that patients use in producing changes in specific physiological
responses. Once identified, these mediators could perhaps be used in
training patients to alter the physiological response producing the pre-
senting problem. A second important direction for biofeedback re-
searchers and clinicians is in the area of generalization of training to the
natural environment. Lynn and Freedman (1979) have suggested some

methods for doing this. These consist of (a) adding booster sessions, (b) fading feedback over time, (c) incorporating stimulus-control procedures (Blanchard, Haynes, Young, & Scott, 1977), (d) training under stressful or stimulating conditions, (e) varying the stimuli associated with training (e.g., therapists, settings such as home vs. laboratory, distractions, noise, etc.), and (f) using other behavioral procedures to augment effects (e.g., stress inoculation training; Meichenbaum, 1976). Related to the generalization of training issue is our third and final recommendation, that considerably more information is needed on people's ability to learn reliable discrimination and self-control of various physiological response systems. For the clinician, the routine use of such procedures ensures that the client has been trained to voluntarily control the response and, in addition, can discriminate when to employ the self-control strategy. The importance of this is aptly demonstrated by a case report by Gainer (1978) in which a migraine client learned to reliably warm her hands in the presence of feedback, but saw no change in headache activity until discrimination training was instituted.

SUMMARY

We have attempted to present the reader with a basic understanding of the methodologies used in recording various physiological response systems, the major options available for and the considerations involved in setting up a clinic or laboratory, the current status of biofeedback research in three major disorders, and possible directions for future research and application of biofeedback techniques. As Blanchard and Epstein (1977, 1978) note, biofeedback can be viewed as a field still in its adolescence. Only additional, carefully controlled research and clinical tests will determine biofeedback's appropriate place as a treatment of psychophysiological disorders.

REFERENCES

Ad Hoc Committee on Classification of Headache. *Journal of the American Medical Association*, 1962, *179*, 717–718.

Alexander, A. B., & Smith, D. D. Clinical applications of electromyographic biofeedback. In R. H. Gotchel & K. P. Price (Eds.), *Clinical applications of biofeedback: Appraisal and status*. New York: Pergamon, 1979.

Amato, A., Hermsmeyer, C. A., & Kleinman, K. M. Use of electromyographic feedback to increase inhibitory control of spastic muscles. *Physical Therapy Review*, 1973, *53*, 1063–1066.

Andrasik, F., & Holroyd, K. A. *Treatment of tension headache: A critical look at the role of biofeedback*. Paper presented at the meeting of the Association for Behavior Analysis, Dearborn, Mich., June, 1979.

Andrasik, F., & Holroyd, K. A. A test of specific and nonspecific effects in the biofeedback treatment of tension headache. *Journal of Consulting and Clinical Psychology*, 1980, *48*, 575–586.

Andreychuk, T., & Skriver, C. Hypnosis and biofeedback in the treatment of migraine headache. *International Journal of Clinical and Experimental Hypnosis*, 1975, *23*, 172–183.

Bakal, D. A. Headache: A biopsychological perspective. *Psychological Bulletin*, 1975, *82*, 369–382.

Ballard, P., Doerr, H., & Varni, J. G. Arrest of a disabling eye disorder using biofeedback. *Psychophysiology*, 1972, *9*, 271.

Basmajian, J. U., Kukulka, C. G., Narayan, M. G., and Takebe, K. Biofeedback treatment of foot-drop after stroke compared with standard rehabilitation techniques: Effects on voluntary control and strength. *Archives of Physical Medicine and Rehabilitation*, 1975, *56*, 231–236.

Benson, H., Shapiro, D., Tursky, B., & Schwartz, G. E. Decreased systolic blood pressure through operant conditioning techniques in patients with essential hypertension. *Science*, 1971, *173*, 740–742.

Bernstein, D., & Borkovec, J. *Progressive relaxation training: A manual for the helping professions.* Champaign, Ill.: Research Press, 1973.

Birk, L. Biofeedback: Furor therapeuticus. In L. Birk (Ed.), *Biofeedback: Behavioral medicine.* New York: Grune & Stratton, 1973.

Blanchard, E. B., & Epstein, L. H. Clinical applications of biofeedback. In M. Hersen, R. M. Eisler, & P. M. Miller (Eds.), *Progress in behavior modification* (Vol. 4). New York: Academic Press, 1977.

Blanchard, E. B., & Epstein, L. H. *A biofeedback primer.* Reading, Mass.: Addison-Wesley, 1978.

Blanchard, E. B., & Haynes, M. R. Biofeedback treatment of a case of Raynaud's disease. *Journal of Behavior Therapy and Experimental Psychiatry*, 1975, *6*, 230–234.

Blanchard, E. B., & Miller, S. T. Psychological treatment of cardiovascular disease. *Archives of General Psychiatry*, 1977, *34*, 1402–1413.

Blanchard, E. B., & Young, L. D. Clinical applications of biofeedback training: A review of evidence. *Archives of General Psychiatry*, 1974, *30*, 573–589.

Blanchard, E. B., Haynes, M. R., Young, L. D., & Scott, R. W. The use of feedback training and a stimulus control procedure to obtain large magnitude increases in heart rate outside of the laboratory. *Biofeedback and Self-Regulation*, 1977, *1*, 81–92.

Blanchard, E. B., Theobald, D. E., Williamson, D. A., Silver, B. V., & Brown, D. A. Temperature biofeedback in the treatment of migraine headaches: A controlled evaluation. *Archives of General Psychiatry*, 1978, *35*, 581–588.

Blanchard, E. B., Miller, S. T., Abel, G. G., Haynes, M. R., & Wicker, R. Evaluation of biofeedback in the treatment of borderline essential hypertension. *Journal of Applied Behavior Analysis*, 1979, *12*, 99–109.

Booker, H. E., Rubow, R. T., & Coleman, P. J. Simplified feedback in neuromuscular retraining: An automated approach using electromyographic signals. *Archives of Physical Medicine and Rehabilitation*, 1969, *50*, 621–625.

Bramwell, J. C., & Hill, A. V. The velocity of the pulse wave in man. *Proceedings of the Royal Society, London*, 1922, *93*, 298–306.

Brener, J. Heart rate. In P. H. Venables & I. Martin (Eds.), *A manual of psychophysiological methods.* Amsterdam: North Holland, 1967.

Brener, J. A general model of voluntary control applied to the phenomena of learned cardiovascular change. In P. A. Obrist, A. H. Black, J. Brener, & L. V. Dicara (Eds.), *Cardiovascular psychophysiology.* Chicago: Aldine, 1974.

Brown, B. B. Recognition aspects of consciousness through association with EEG alpha activity represented by a light signal. *Psychophysiology*, 1970, *5*, 442–452.

Brown, B. B. Awareness of EEG-subjective activity relationships detected within a closed feedback system. *Psychophysiology*, 1971, *6*, 442–452.

Brudny, J., Grynbaum, B. B., & Korein, J. Spasmodic torticollis: Treatment by feedback display of the EMG. *Archives of Physical Medicine and Rehabilitation*, 1974, *58*, 403–408.

Brudny, J., Korein, J., Levidow, L., Grynbaum, B. B., Lieberman, A., & Friedmann, L. W. Sensory feedback therapy as a modality of treatment in central nervous system disorders of voluntary movement. *Neurology, Minneapolis,* 1974, *24,* 925–932.

Budzynski, T. H., & Stoyva, J. M. An instrument for producing deep muscle relaxation by means of analog information feedback. *Journal of Applied Behavior Analysis,* 1969, *2,* 231–237.

Budzynski, T. H., Stoyva, J. M., & Adler, C. S. Feedback-induced muscle relaxation: Application to tension headache. *Journal of Behavior Therapy and Experimental Psychiatry,* 1970, *1,* 205–211.

Budzynski, T. H., Stoyva, J., Adler, C. S., & Mullaney, D. J. EMG biofeedback and tension headache: A controlled outcome study. *Psychosomatic Medicine,* 1973, *6,* 509–514.

Campbell, D. T., & Stanley, J. C. *Experimental and quasi-experimental disigns for research.* Chicago: Rand McNally, 1966.

Chesney, M. A., & Shelton, J. L. A comparison of muscle relaxation and electromyogram biofeedback treatments for muscle contraction headache. *Journal of Behavior Therapy and Experimental Psychiatry,* 1976, *7,* 221–225.

Cox, D. J., Freundlich, A., & Meyer, R. J. Differential effectiveness of electromyograph feedback, verbal relaxation instructions, and medication placebo with tension headaches. *Journal of Consulting and Clinical Psychology,* 1975, *43,* 892–899.

Elder, S. T., Ruiz, Z. B., Deabler, H. L., & Dillenkoffer, R. L. Instrumental conditioning of diastolic blood pressure in essential hypertensive patients. *Journal of Applied Behavior Analysis,* 1973, *6,* 377–382.

Engel, B. T., & Bleecker, E. R. Application of operant conditioning techniques to the control of cardiac arrhythmias. In P. A. Obrist, A. H. Black, J. Brener, & L. V. DiCara (Eds.), *Cardiovascular psychophysiology.* Chicago: Aldine, 1974.

Engel, B. T., Nikoomanesh, P., & Schuster, M. M. Operant conditioning of rectosphincteric responses in the treatment of fecal incontinence. *New England Journal of Medicine,* 1974, *290,* 646–649.

Epstein, L. H., & Blanchard, E. B. Biofeedback, self-control, and self-management. *Biofeedback and Self-Regulation,* 1977, *2,* 201–211.

Epstein, L. H., Katz, R. C., & Zlutnick, D. Behavioral medicine. In M. Hersen, R. M. Eisler, & P. M. Miller (Eds.), *Progress in behavior modification* (Vol. 7). New York: Academic Press, 1979.

Feuerstein, M., & Adams, H. E. Caphalic vasomotor feedback in the modification of migraine headaches. *Biofeedback and Self-Regulation,* 1977, *2,* 241–253.

Feuerstein, M., & Schwartz, G. E. Training in clinical psychophysiology: Present trends and future goals. *American Psychologist,* 1977, *32,* 560–567.

Friar, L. R., & Beatty, J. Migraine: Management by a trained control of vasoconstriction. *Journal of Consulting and Clinical Psychology,* 1976, *44,* 46–53.

Furman, S. Intestinal biofeedback in functional diarrhea: A preliminary report. *Journal of Behavior Therapy and Experimental Psychiatry,* 1973, *4,* 317–321.

Gainer, J. C. Temperature discrimination training in the biofeedback treatment of migraine headache. *Journal of Behavior Therapy and Experimental Psychiatry,* 1978, *9,* 185–188.

Gordon, T., & Devine, B. Hypertension and hypertensive heart disease in adults. In *Vital and health statistics, 1966* (Series II, No. 13). Washington, D.C.: U.S. Department of Health, Education, and Welfare, 1966.

Hager, J. L., & Surwit, R. S. Hypertension self-control with a portable feedback unit or meditation-relaxation. *Biofeedback and Self-Regulation,* 1978, *3,* 269–276.

Haynes, S. N., Griffin, P., Mooney, D., & Parise, M. Electromyographic biofeedback and relaxation instructions in the treatment of muscle contraction headaches. *Behavior Therapy,* 1975, *6,* 672–678.

Holroyd, K. A., Andrasik, F., & Westbrook, T. Cognitive control of tension headache. *Cognitive Therapy and Research,* 1977, *1,* 121–133.

Holroyd, K. A., Andrasik, F., & Noble, J. A comparison of EMG biofeedback and a credible pseudotherapy in treating tension headache. *Journal of Behavioral Medicine,* 1980, *3,* 29–39.

Hutchings, D. F., & Reinking, R. H. Tension headache: What form of therapy is most effective? *Biofeedback and Self-Regulation*, 1976, 7, 183–190.

Kamiya, J. Conscious control of brain waves. *Psychology Today*, 1968, 1, 57–60.

Kondo, C. Y., & Canter, A. True and false electromyograph feedback: Effect on tension headache. *Journal of Abnormal Psychology*, 1977, 86, 93–95.

Kotses, H., Glaus, K. D., Crawford, P. L., Edwards, J. E., Scherr, M. S. Operant reduction of frontalis EMG activity in the treatment of asthma in children. *Journal of Psychosomatic Research*, 1976, 20, 453–459.

Kristt, D. A., & Engel, B. T. Learned control of blood pressure in patients with high blood pressure. *Circulation*, 1975, 51, 370–378.

Lang, P. J. Acquisition of heart-rate control: Method, theory, and clinical implications. In D. C. Fowles (Ed.), *Clinical applications of psychophysiology*. New York: Columbia University Press, 1975.

Lippold, O. C. J. Electromyography. In P. H. Venables & I. Martin (Eds.), *A manual of psychophysiological methods*. Amsterdam: North-Holland, 1967.

Lynn, S. J., & Freedman, R. R. Transfer and evaluation of biofeedback treatment. In A. P. Goldstein & F. Kanfer (Eds.), *Maximizing treatment gains: Transfer enhancement in psychotherapy*. New York: Academic Press, 1979.

Manuso, J. S. J. The use of biofeedback-assisted hand warming training in the treatment of chronic eczematous dermatitis of the hands: A case study. *Journal of Behavioral Therapy and Experimental Psychiatry*, 1977, 8, 445–446.

McKenzie, R. E., Ehrisman, W. J., Montgomery, P. S., & Barnes, R. H. The treatment of headache by means of electroencephalographic biofeedback. *Headache*, 1974, 14, 164–172.

Meichenbaum, D. Cognitive factors in biofeedback therapy. *Biofeedback and Self-Regulation*, 1976, 1, 201–216.

Miller, N. E., & Dworkin, B. R. Critical issues in therapeutic applications of biofeedback. In G. E. Schwartz & J. Beatty (Eds.), *Biofeedback: Theory and research*. New York: Academic Press, 1977.

Mills, G. K., & Solyom, L. Biofeedback of EEG alpha in the treatment of obsessive ruminations: An exploration. *Journal of Behavior Therapy and Experimental Psychiatry*, 1974, 5, 37–41.

Moeller, T. A., & Love, W. A. *A method to reduce arterial hypertension through muscular relaxation*. Unpublished manuscript, Nova University, Ft. Lauderdale, Florida, 1974.

Mulhall, D. J., & Todd, R. W. Deconditioning by the use of EMG signals. *Behavior Therapy*, 1975, 6, 125–127.

Mullinix, J. M., Norton, B. J., Hack, S., & Fishman, M. A. Skin temperature biofeedback and migraine. *Headache*, 1978, 17, 242–244.

Obrist, P. A., Light, K. C., McCubbin, J. A., Hutcheson, J. S., & Hoffer, J. L. Pulse transit time: Relationship to blood pressure and myocardial performance. *Psychophysiology*, 1979, 16, 292–301.

Patel, C. H. Yoga and biofeedback in the management of hypertension. *Lancet*, 1973, 2, 1053–1055.

Patel, C. H. 12-month follow-up yoga and biofeedback in the management of hypertension. *Lancet*, 1975, 1, 62–67.

Patel, C. H., & North, W. R. S. Randomized controlled trial of yoga and biofeedback in management of hypertension. *Lancet*, 1975, 2, 93–99.

Paul, G. L. Behavior modification research: Design and tactics. In C. M. Franks (Ed.), *Behavior therapy: Appraisal and status*. New York: McGraw-Hill, 1969.

Philips, C. A psychological analysis of tension headache. In S. Rachman (Ed.), *Contributions of medical psychology* (Vol. 1). New York: Pergamon, 1977. (a)

Philips, C. The modification of tension headache pain using EMG biofeedback. *Behavior Research and Therapy*, 1977, 15, 119–129. (b)

Philips, C. Tension headache: Theoretical problems. *Behavior Research and Therapy*, 1978, 16, 249–261.

Reavley, W. The use of biofeedback in the treatment of writer's cramp. *Journal of Behavior Therapy and Experimental Psychiatry*, 1975, 6, 335–338.

Rosen, R. C. *The control of penile tumescence in the human male.* Paper presented at the meeting of the American Psychological Association, New Orleans, 1974.

Rouse, L., Peterson, J., & Shapiro, G. *EEG alpha entrainment reaction within the biofeedback setting and some possible effects on epilepsy.* Paper presented at the meeting of the Biofeedback Research Society, Colorado Springs, February 1974.

Sargent, J. D., Green, E. E., & Walters, E. D. The use of autogenic feedback training in a pilot study of migraine and tension headaches. *Headache*, 1972, 12, 120–125.

Sargent, J. D., Green, E. E., & Walters, E. D. Preliminary report on the use of autogenic feedback training in the treatment of migraine and tension headaches. *Psychosomatic Medicine*, 1973, 35, 129–135.

Sargent, J. D., Walters, E. D., & Green, E. E. Psychosomatic self-regulation of migraine headaches. *Seminars in Psychiatry*, 1973, 5, 415–428.

Schultz, J. H., & Luthe, W. *Autogenic therapy* (Vol. 1). New York: Grune & Stratton, 1969.

Schwartz, G. E. Voluntary control of human cardiovascular integration and differentiation in man through feedback and reward. *Science*, 1972, 175, 90–93.

Scott, R. W., Blanchard, E. B., Edmundson, E. D., & Young, L. D. A shaping procedure for heart-rate control in chronic tachycardia. *Perceptual Motor Skills*, 1973, 37, 327–338.

Shapiro, D., & Surwit, R. S. Learned control of physiological function and disease. In H. Leitenberg (Ed.), *Handbook of behavior modification and behavior therapy.* Englewood Cliffs, N.J.: Prentice-Hall, 1976.

Shapiro, D., Tursky, B., Gershon, E., & Stern, M. Effects of feedback and reinforcement on control of human systolic blood pressure. *Science*, 1969, 163, 588–590.

Shaw, J. C. Quantification of biological signals using integration techniques. In P. H. Venables & I. Martin (Eds.), *Manual of psychophysiological methods.* New York: Wiley, 1967.

Shoemaker, J. E., & Tasto, D. L. The effects of muscle relaxation on blood pressure of essential hypertensives. *Behavior Research and Therapy*, 1975, 13, 29–43.

Sittenfeld, P. The control of the EEG theta rhythm. In J. Kamiya, T. X. Barber, N. E. Miller, D. Shapiro, and J. Stoyva (Eds.), *Biofeedback and self-control.* Chicago: Aldine, 1977.

Steinmark, S., & Borkovec, T. Active and placebo treatment effects on moderate insomnia under counter demand and positive demand instruction. *Journal of Abnormal Psychology*, 1974, 83, 157–163.

Steptoe, A. The regulation of blood pressure reactions to taxing conditions using pulse transit time feedback and relaxation. *Psychophysiology*, 1978, 15, 429–439.

Steptoe, A., Smulyan, H., & Gribbin, B. Pulse wave velocity and blood pressure change: Calibration and applications. *Psychophysiology*, 1976, 13, 488–493.

Sterman, M. B. Neurophysiological and clinical studies of sensorimotor EEG biofeedback training: Some effects on epilepsy. In L. Birk (Ed.), *Biofeedback: Behavioral medicine.* New York: Grune & Stratton, 1973.

Sterman, M. B., & Friar, L. Supression of seizures in an epileptic following sensorimotor EEG feedback training. *Electroencephalography and Clinical Neurophysiology*, 1972, 33, 89–95.

Sturgis, E. T., Tollison, C. D., & Adams, H. E. Modification of combined migraine-muscle contraction headaches using BVP and EMG feedback. *Journal of Applied Behavior Analysis*, 1978, 11, 215–233.

Surwit, R. S. Biofeedback: A possible treatment for Raynaud's disease. In L. Birk (Ed.), *Biofeedback: Behavioral medicine.* New York: Grune & Stratton, 1973.

Surwit, R. S., Shapiro, D., & Good, M. I. Comparison of cardiovascular biofeedback, neuromuscular biofeedback, and meditation in the treatment of borderline essential hypertension. *Journal of Consulting and Clinical Psychology*, 1978, 46, 252–263.

Tamayo, F. M. U., Standley, S. M., & Treon, M. A. *The use of amplitude GSR biofeedback in the modification of stuttering frequency.* Paper presented at the meeting of the Western Psychological Association, Anaheim, California, April 1973.

Toomin, M. K., & Toomin, H. GSR biofeedback in psychotherapy: Some clinical observations. *Psychotherapy: Theory, Research and Practice,* 1975, *12,* 33–38.

Townsend, R. E., House, J. F., & Addario, D. A comparison of biofeedback-mediated relaxation and group therapy in the treatment of chronic anxiety. *American Journal of Psychiatry,* 1975, *132,* 598–601.

Tursky, B., Shapiro, D., & Schwartz, G. E. Automated constant cuff-pressure system to measure average systolic and diastolic blood pressure in man. *IEEE Transactions in Bio-Medical Engineering,* 1972, *19,* 271–276.

Varni, J. G. *The use of biofeedback in the treatment of vaginismus.* Paper presented at the meeting of the Society for Psychophysiological Research Galveston, Texas, 1973.

Weber, E. S. P., & Fehmi, L. G. *The therapeutic use of EEG feedback.* Paper presented at the meeting of the Biofeedback Research Society, Monterey, California, February 1975.

Weiss, T., & Engel, B. T. Operant conditioning of heart rate in patients with premature ventricular contractions. *Psychosomatic Medicine,* 1971, *33,* 301–321.

Wickramasekera, I. Heart rate feedback and the management of cardiac neurosis. *Journal of Abnormal Psychology,* 1974, *83,* 578–580.

Young, L. D., Langford, H. G., & Blanchard, E. B. Effect of operant conditioning of heart rate of plasma renin activity. *Psychosomatic Medicine,* 1976, *38,* 278–281.

Social Skills and Physical Disability

MICHAEL E. DUNN AND STEVEN H. HERMAN

INTRODUCTION

Medical and physical rehabilitation of persons with major medical disorders such as spinal cord injury has progressed to the point where normal life spans are expected and physical mobility problems no longer interfere with leading a full life (Mesard, Carmody, Mannarino, & Ruge, 1978). Such advances in medical and physical rehabilitation may be insufficient however, unless accompanied by efforts to facilitate patients' psychosocial rehabilitation. One study (cited by Morgan, 1972, p. 37) has shown that in a comparison of two very similar spinal cord injury rehabilitation programs, the one that offered an augmented psychosocial program in addition to medical treatment resulted in patients who maintained their hospital-learned physical gains in the first 90 days after discharge. Of the group that received medical treatment only, 50% deteriorated in the same time period.

Psychosocial rehabilitation initially involves a wide variety of cognitive, emotional, and behavioral coping processes enabling the patient to deal with the immediate physical consequences of the medical disorder. Eventually, the person must come to terms with not only the physical

MICHAEL E. DUNN • Psychology Service, Veterans Administration Medical Center, Palo Alto, California 94304.   STEVEN H. HERMAN • Psychology Service, Veterans Administration Medical Center, and Behavioral Medicine Institute, Miami, Florida 33167. Preparation of portions of this manuscript was supported in part by grants from the Miami Veterans Administration Medical Center (numbers 1963-03, 3582-01, and 3582-03) and by the Veterans Administration Cooperative Studies Program (CSP #143).

limitations but also the broader psychosocial implications of the disability. Thus, the final goal of all rehabilitation efforts must extend beyond physical survival and mobility to include helping the patient develop a meaningful, productive style of life and become successfully reintegrated into the larger community. Although most professionals in the rehabilitation field would agree about the importance of psychosocial intervention, there is much ambiguity concerning just what this would entail. Trieschmann (1978), in a recent comprehensive survey of psychological, social, and vocational adjustment in spinal cord injury, has documented the many gaps in our understanding of this process and the few well-designed or evaluated treatment programs that do exist.

Assertive and social skills assessment and training procedures have been a very recent addition to the clinical armamentarium of psychologists working with medical populations, but the need has been emphasized for more than 30 years. Ladieu-Leviton, Adler, & Dembo (1948) discussed the social consequences of a severe physical disability based on extensive interviews with amputees and facially disfigured veterans. These individuals emphasized their embarrassment about being seen in public, misconceptions about their physical limitations, squeamishness about their appearance, spread of emotional affect from the injury to other personal characteristics, and the social rejection they felt.

This chapter will discuss the need for social skills training in those individuals with acute and chronic medical conditions. Using our research program in social skills with spinal cord injured individuals as a guide, we will illustrate the recent attempts to provide empirical assessment techniques and effective treatment modalities for possible use with other medical populations. Although most rehabilitation efforts appear to be aimed at physical improvement, little is known about the relationship between general social skillfulness, ability to manage the social aspects of a specific medical disorder or disability, and ultimate rehabilitation potential and outcome.

COMMON PROBLEMS

In addition to the obvious physical handicaps involved in a physical disability, the newly handicapped individual must learn to deal with a changed social environment (Davis, 1961; Safilios-Rothschild, 1970). This environment can be conceptualized as four different areas: (1) public attitudes; (2) differential behavioral patterns of nonhandicapped people toward the handicapped; (3) special social situations that apply to specific medical disorders; and (4) decreased general assertiveness.

Public Attitudes

Public attitudes toward handicapped individuals are well documented in the literature (Albrecht, Harasymiw, & Horne, 1977;

Brookfield, 1969; Yuker, Block, & Young, 1966). For example, Albrecht *et al.* (1977) interviewed a random sample of Chicago residents in the Loop area and found that 76% of them felt that one should not expect as much from the handicapped as from the nonhandicapped, 36% felt that most handicapped persons do not get married or have children, and 43% felt that people who are paraplegic tend to be bitter. Weinberg (1976) compared the attitudes of college students toward minimally described, well-liked, and disabled persons and found that "the disabled person was viewed as less socially skilled, as more dependent, as more politically conservative and as more personally "good" (p. 115). These attitudes are thought to be due to (1) fears of similar accidents happening to the self, (2) ambiguity caused by the newness of the situation, (3) anxiety about saying the wrong thing, (4) fear of embarrassing the handicapped person or hurting his or her feelings, and (5) lack of contact with handicapped people. These generalized devaluation attitudes may be shared by those who become disabled and, thus, contribute to their poor self-image (Dixon, 1977). Comer and Piliavin (1972) have shown that devaluation attitudes are reflected in increased discomfort and passivity in handicapped persons interacting with nonhandicapped persons.

Differential Behavioral Patterns

In this country, conflicting cultural values require us to be kind, compassionate, and helpful to handicapped people. This conflict has a number of behavioral and psychophysiological effects. Kleck (1966, 1968) and Kleck, Ono, and Hastorf (1966) have shown that, when interacting with a handicapped person, the nonhandicapped tend to (1) show increased anxiety levels as measured by GSR, (2) show more motoric inhibition, (3) express attitudes not consonant with their own beliefs, and (4) say they liked the handicapped person and enjoyed the interaction even though high anxiety was being felt. These incongruent attitudes and behaviors serve to decrease the amount of appropriate negative feedback and increase the amount of noncontingent positive feedback that the handicapped person receives. Patronization and condescension can thus result from more positive social reinforcement and less negative social punishment than is objectively warranted. Thus, "his social world has a facade-like quality in which others do not act naturally or reveal much of their idiosyncratic personalities" (Kelley, Hastorf, Jones, Thibaut, & Usdane, 1960, p. 188). Without appropriate social feedback, aggressive and/or passive behaviors are reinforced, or at least unpunished. A decrease in general assertiveness and self-concept can result. Two further consequences of the above analysis have been suggested by Kelley *et al.* (1960). The first refers to status relationships:

> Insofar as normal individuals regard handicapped persons as low in status and power while the latter do not so regard themselves, the handicapped individual will find that he gets too little credit for being pleasant, agreeable, or com-

pliant, and that his actions of resistance and noncompliance are greatly mag-
nified and evoke unexpectedly negative evaluations. (p. 201)

The second deals with employment:

Assuming that an employer experiences a good deal of conflict and uncertainty
about hiring and terminating a handicapped worker, theory suggests that cer-
tain consequences are likely to follow: overidealization accompanying hiring,
unrealistic expectations of performance and social approval, and overcriticism
and excessive blaming as a prelude to termination. (p. 196)

Special Social Situations

Different types of handicaps may also produce special social situa-
tions that can require an additional set of specific social skills. Dunn
(1977) had 40 spinal cord–injured patients rate 20 potentially difficult
social situations specifically related to the spinal cord disability, based on
the amount of discomfort or embarrassment they felt in those situations.
The three most difficult situations were an accidental bowel movement
in public, leaks in urinary drainage apparatus, and falling out of the
wheelchair. Blind people report that dealing with people who talk loud to
them, try to grab their arms to lead them, and talk about them even
though they are present are some of the special social situations with
which they must frequently deal (*What Do You Do When You See A
Blind Person*, 1975). Social situations are complicated for the person with
a cerebral vascular accident because of receptive or expressive aphasia
that can hinder communication.

General Assertiveness

Typical hospital rehabilitation does not appear to be suited to teach-
ing individuals the social skills for independence and reintegration into
the community (Trieschmann, 1978). Rehabilitation therapies are deliv-
ered through informal, time-limited units in which the person is the
passive recipient of instructions from the professional staff. Formal
therapies tend to permit little behavioral independence, and the number
of behavioral alternatives available to the patient are limited. The hospi-
tal might unintentionally undermine social competence because there is
little opportunity to practice social skills. Basically, the person with a
disability is in a subordinate position throughout the hospitalization and
would feel very unskilled at coping with the devaluation that will be
experienced after discharge. Rehabilitation services are delivered primar-
ily through aides and orderlies, and these individuals appear to have the
least training in behavioral-interaction skills. In order to accomplish their
assigned duties, they often must reward dependent behaviors on the part
of the patient. When not in formal therapies, much of the person's be-
havioral time is idle. The highest rate of patient independence appears in

those activities that are only accompaniments of comprehensive rehabilitation (passive recreation, eating, transporting), whereas those activities that lie at the heart of current comprehensive rehabilitation (exercise, functional training, nursing care, and hygiene) produce the lowest rates of independence. In effect, the hospital environment is essentially a deprivational one, since the patient does not have the opportunity to perform and/or learn the majority of socially determined acts whose skillful performance are basic to normal daily transactions. For the most part, the hospital environment tends to simplify the task of being a patient (Trieschmann, 1978).

Thus, many individuals with spinal cord injury are discharged from rehabilitation centers with little or no practice or training in the social skills that are necessary to cope with the devaluation that they will experience from able-bodied persons as well as from themselves. Cogswell (1968) points out that spinal cord–injured individuals mainly discover these problem areas for themselves and proceed to handle them in their own ways. They become their own socializing agents as well as agents for the people they encounter who are uncertain about proper behavior toward a disabled person. In learning these skills of stigma management, change is more apt to occur through day-to-day accommodation to problems than through systematic goal-directed behavior. Compared to pretrauma life, spinal cord–injured individuals on returning home display a marked reduction in (1) the number of social contacts with others in the community, (2) the frequency of entering community settings, and (3) the number of roles they play. Reentry into the community appears to be gradual and can be structured simultaneously by sequential choice of settings and associates. In essence, they search out the least threatening environments for the trial-and-error learning of new behavior. Spinal cord–injured individuals appear to enter first those social settings that require the least amount of physical and social skill and proceed later to those that are more difficult. Physical accessibility, flexibility for leaving the scene, and salience of stigma appear to be major contributing factors. In social relationships, spinal cord–injured individuals phase out and seldom resume relationships with pretrauma friends; they begin to associate with individuals of lower social status and then they begin to associate with new individuals of equal status. If at any point in this process the natural environment does not provide adequate reinforcing experiences, the spinal cord–injured individual may cease or regress in his or her social development.

> The onset of spinal injury changes a person's social stimulus value, and this change will be reflected in almost all areas of life. The world is designed for and populated by able bodied people who become constricted and uncomfortable in the presence of a person with a disability. The success of the disabled person's social interactions largely depends on his ability to assert himself, to initiate contact, and to put the other person at ease. This requires a large repertoire of social skills which he usually must learn by himself. Some never learn to be

socially skillful, and their productivity may be limited as a result. We need to
introduce social skills training as a part of the rehabilitation program, and we
need to develop research programs which document the outcomes of these
efforts. (Trieschmann, 1978, p. 94)

The scope of this problem has been recognized in the rehabilitation
literature (Cogswell, 1968; Dunn, 1975; Hyman, 1972; Kahn, 1969;
Morgan, 1972; Richardson, 1963; Trieschmann, 1978), but only recently
have clinical researchers begun to assess the social behavior of physically
handicapped persons and to help them learn better ways of dealing with
the social consequences of their disabilities.

Since the early work on assertiveness by Salter (1949) and Wolpe
(1958), much progress has been made in social skills training and assess-
ment, both in the number of behaviors trained and in the kinds of pa-
tients served. Besides a number of books for the general population (e.g.,
Fensterheim & Baer, 1975; Smith, 1975), social skills training has been
shown to be effective with socially anxious college students (MacDonald,
Lindquist, Kramer, McGrath, & Rhyne, 1975), blacks (Cheek, 1976),
nonassertive women (Jakubowski-Spector, 1973; Rathus, 1973a), al-
coholics (Hirsch, 1977), explosive patients (Fredericksen, Jenkins, Foy, &
Eisler, 1976), and chronic schizophrenics (Hersen & Bellack, 1976;
Muzekari & Kamis, 1973). Additionally, de Montmollin, Herman, and
Rice (1978) have shown that social skills assessment procedures can be
helpful in working with drug and alcohol abusers as well as with general
medical and surgical patients.

ASSESSMENT OF SOCIAL SKILLS IN THE PHYSICALLY DISABLED

In assessing social skills of physically disabled individuals, clinical
researchers have relied heavily on assessment devices that had been pre-
viously cited in the behavior therapy–social skills literature. In general,
these devices were developed with psychiatric and/or college populations
and were aimed at assessing functioning in everyday social situations
(i.e., requesting correct change from a salesperson). These devices were
either used with the disabled as they had been developed or were adapted
in format to include social situations that involved a specific disability
(i.e., turning down an offer to push a wheelchair). For the most part,
assessment techniques in social skills research have primarily focused on
three types of dependent measures: self-report, objective performance,
and external validity measures.

Self-Report

Self-report measures might ask patients to rate the amount of anxiety
or discomfort felt in particular situations, as well as the probability that

they would respond in a particular manner if in that situation (Gambrill & Richey, 1975; Herman, Dunn, Van Horn, & de Montmollin, 1977; Herman, Van Horn, & Dunn, 1977). Alternately, patients might be asked to rate the extent to which (Rathus, 1973b) or whether or not (Wolpe & Lazarus, 1966) a particular item is descriptive of themselves. One scale asks patients to make a forced choice from a number of alternative behavioral responses to a specific social situation (Ginsburg, 1978).

Only two scales have been developed specifically for use with physically disabled individuals. Ginsburg (1978) designed a 42-item questionnaire for wheelchair-bound individuals in both general social and disability-specific interpersonal situations. Items were selected on the basis of being rated as highly relevant by wheelchair-confined adult volunteers, as well as by being judged by "experts" to be appropriate assertive responses. In its final form, the scale was not administered to disabled individuals but rather was answered by "significant others" who knew the patients in a variety of social situations, and were asked to check off the responses that best represented how they felt the patients would typically handle specific interpersonal social situations. These data were used, in part, to validate a similar series of role-played scenes in a free-response assertion measure.

Table I presents the Spinal Cord Injury Assertion Questionnaire (SCIAQ) (Herman, Dunn, Van Horn, & de Montmollin, 1977; Herman, Van Horn, & Dunn, 1977), a revision of the Social Situations Questionnaire (Dunn, 1977). Twenty-six potentially sensitive social situations specifically related to the spinal cord disability (i.e., ask someone to help you up a curb; greet an old friend who does not know that you are paralyzed) were selected from the original instrument. Input was gained from spinal cord–injured patients, rehabilitation staff, and from clinical and personal experience. Each item was rated on five-point scales based on (a) how much discomfort or anxiety the individual would feel if placed in that situation (1 = none; 5 = very much) and (b) the likelihood of displaying or engaging in the particular behavior if actually placed in that situation (1 = always do it; 5 = never do it). Scores were summed over items to yield anxiety–discomfort and response probability scores. Various profiles can be generated if discomfort and response probability scores are compared for high and low values: unassertive (high discomfort and low response probability), anxious performer (high discomfort but high response probability), depressive (low discomfort and low response probability), and appropriately assertive (low discomfort and high response probability).

In a recent reliability study, 81 patients from four different Veterans Administration medical centers filled out the questionnaire and retook it 2 weeks later. Test–retest reliability was .80 for the anxiety subscale and .60 for response probability, whereas odd–even reliability was .84 for anxiety and .67 for response probability (corrected for test length). All these values were statistically significant at $p < .001$ $(df = 79)$. The mean

TABLE I. THE SPINAL CORD INJURY ASSERTION QUESTIONNAIRE (SCIAQ)

Many people experience some difficulty in handling interpersonal situations requiring them to assert themselves in some way, for example, turning down a request, asking a favor, giving someone a compliment, expressing disapproval or approval, etc. For each of the following items, *imagine that you are actually in that particular situation.* Then indicate the degree of discomfort or anxiety you would have or feel if you were in that situation. Use the following scale to indicate your degree of discomfort or anxiety:

1	2	3	4	5
None	A Little	A Fair Amount	Much	Very Much

Read each item and circle the number that follows it that indicates HOW MUCH DISCOMFORT OR ANXIETY WOULD YOU FEEL IF YOU HAD TO—

A.	Ask someone to help you up a curb	(1)	(2)	(3)	(4)	(5)
B.	Greet an old friend who does not know that you are paralyzed	(1)	(2)	(3)	(4)	(5)
C.	Ask someone to help you light a cigarette	(1)	(2)	(3)	(4)	(5)
D.	Turn down an offer to push your wheelchair	(1)	(2)	(3)	(4)	(5)
E.	Suggest to your friends another place to go that is more readily wheelchair accessible	(1)	(2)	(3)	(4)	(5)
F.	Make the arrangements when you go into a restaurant and the hostess asks your date (wife), "How many, please"	(1)	(2)	(3)	(4)	(5)
G.	Ask for help in a cafeteria	(1)	(2)	(3)	(4)	(5)
H.	Turn down help from a passerby who offers to put your wheelchair in your car	(1)	(2)	(3)	(4)	(5)
I.	Respond seriously to a little child who comes up to you and says, "Why are you in that chair?"	(1)	(2)	(3)	(4)	(5)
J.	Put people at ease when, while at a party, you discover that your external catheter has popped	(1)	(2)	(3)	(4)	(5)
K.	Find out if a place that you want to go (movie, concert, restaurant, hotel, etc.) is wheelchair accessible	(1)	(2)	(3)	(4)	(5)
L.	Ask someone to help you empty your leg bag	(1)	(2)	(3)	(4)	(5)
M.	Turn down help from a passerby who insists on putting your wheelchair in your car for you	(1)	(2)	(3)	(4)	(5)
N.	Put people who do not know you very well at ease when you begin to spasm	(1)	(2)	(3)	(4)	(5)
O.	Ask people to move out of your way	(1)	(2)	(3)	(4)	(5)
P.	Turn down an offer from a drunk to buy you a drink after he has told you and your friends at a bar how brave he thinks you are	(1)	(2)	(3)	(4)	(5)
Q.	Make arrangements to take an airplane trip	(1)	(2)	(3)	(4)	(5)
R.	Ask a passerby for help after you have fallen out of your wheelchair	(1)	(2)	(3)	(4)	(5)
S.	Explain about your injury to someone whom you have just met who asks you about it	(1)	(2)	(3)	(4)	(5)
T.	Ignore people who stare at you at a shopping center	(1)	(2)	(3)	(4)	(5)
U.	Ask a young girl who pats you on your head and says, "Poor dear," to stop treating you like an invalid	(1)	(2)	(3)	(4)	(5)
V.	Instruct a person who does not know anything about spinal cord injury how to help you	(1)	(2)	(3)	(4)	(5)
W.	Tell a friend that it is difficult for you to accept the amount of help that he gives you	(1)	(2)	(3)	(4)	(5)

TABLE I (*continued*)

X.	Order for yourself when you are in a restaurant and the waitress asks your date (wife), "What does he want?"		(1) (2) (3) (4) (5)
Y.	Ask a motorist to move his car out of a parking spot reserved for handicapped drivers		(1) (2) (3) (4) (5)
Z.	Put at ease people who do not know you very well after you have had an accidental bowel movement		(1) (2) (3) (4) (5)

Please go over the above items again. This time, indicate for each item the probability or likelihood of your displaying or engaging in the particular behavior *if you were actually placed in that situation.* That is, how often would you respond in the manner suggested in the item if you were actually involved in that scene. Use the following scale to indicate your response probability:

1	2	3	4	5
Always Do It	Usually Do It	Do it about Half the time	Rarely Do It	Never Do It

For example, if you rarely apologize when you are at fault, you would circle a "4" after that item. Please do not look at your previous answers above while doing the present response probability ratings. Otherwise, one rating may contaminate the other and a realistic assessment of your behavior is unlikely. Read each item and indicate the probability or likelihood of your displaying or engaging in the particular behavior if you were actually in that situation. (The items are repeated.)

score for the first administration for anxiety was 57.77 ($SD = 16.77$) and for response probability was 60.88 ($SD = 12.12$). The values for the second administration were similar. Table II shows the 10 items ranked highest on anxiety–discomfort and their respective ratings on the five-point scale, and Table III shows the same data for the items with the lowest response probabilities. It would appear from these tables that items concerned with bowel and bladder control are especially troublesome, as are items having to do with turning down help, condescension and dealing with friends. For 54 subjects, age, length of time injured, and type of injury (paraplegic vs. quadriplegic) were correlated with total scores on the first administration of each of the two scales. Only type of injury and response probability were correlated at a statistically significant level ($r = .315$, $p < .01$). Although statistically significant due to the large number of subjects, this low correlation and the absence of any other correlation of the test score with these demographic variables (Herman, Dunn, Van Horn, & de Montmollin, 1977; Herman, Van Horn, & Dunn, 1977) further confirms experimental findings (Trieschman 1978) that response to traumatic injury is not necessarily a function of severity and length of injury.

Objective Performance

The scales have been used in social skills research programs with spinal cord–injured veterans (Dunn, Van Horn, & Herman, 1981; Gallen-

berger, 1979; Herman, Dunn, Van Horn, & de Montmillon, 1977; Herman, Van Horn, & Dunn, 1977). In its original form, the Social Situations Questionnaire was significantly correlated with staff ratings of adjustment to disability (Dunn, 1977). In its current form, the anxiety–discomfort scale is significantly correlated with the anxiety–discomfort scale of the Gambrill Assertion Inventory and negatively correlated with ratings of overall assertiveness on a videotaped Behavioral Assertiveness Test. The response probability scale has been found to be significantly correlated with both subscales of the Gambrill Assertion Inventory, with requests for new behaviors on the videotaped Behavioral Assertiveness Test, and, more importantly, with a social mobility or social interaction quotient.

The Behavioral Assertiveness Test (Eisler, Hersen, & Miller, 1973; McFall & Marston, 1970) allows a more objective measure of actual performance to be made. In this procedure, the patient is seated across from a confederate (experimenter). An interpersonal social situation is described by a narrator (via a tape recording). The confederate then presents a naturalistic prompt, and the subject is expected to respond as if the situation were occuring. In our research (Dunn *et al.*, 1981; Herman, Dunn, Van Horn, & de Montmillon, 1977; Herman, Van Horn, & Dunn, 1977), two sets of 10 scenes each were presented, one set by a female confederate and the other by a male. Each set consisted of two warm-up scenes, three scenes involving general social situations (Eisler, Miller, & Hersen, 1973, scenes 5, 11, 12, 13, & 14; Hersen, Eisler, & Miller, 1974, scenes 4, 5, & 8) and five scenes directly related to the spinal cord injury disability. Table

TABLE II. TEN HIGHEST RANKING ITEMS ON DISCOMFORT ON THE SCIAQ ($N = 81$)

Rank	Item	Rating (1–5)
1.	Put at ease people whom do not know you very well after you have had an accidental bowel movement	3.79
2.	Put people at ease when, while at a party, you discover that your external catheter has popped	3.56
3.	Order for yourself when you are in a restaurant and the waitress asks your date (wife), "What does he want?"	3.29
4.	Ask someone to help you empty your leg bag	2.75
5.	Ask a passerby for help after you have fallen out of your wheelchair	2.51
6.	Ask a young girl who pats you on your head and says, "Poor dear," to stop treating you like an invalid	2.49
7.	Greet an old friend who does not know that you are paralyzed	2.44
8.	Tell a friend that it is difficult for you to accept the amount of help that he gives you	2.39
9.	Turn down an offer from a drunk to buy you a drink after he has told you and your friends at a bar how brave he thinks you are	2.32
10.	Instruct a person who does not know anything about spinal cord injury how to help you	2.27

TABLE III. TEN LOWEST RANKING ITEMS ON RESPONSE PROBABILITY
ON THE SCIAQ $(N = 81)$

Rank	Item	Rating (1–5)
1.	Ask someone to help you empty your leg bag	3.52
2.	Ask someone to help you light a cigarette	3.48
3.	Turn down help from a passerby who offers to put your wheelchair in your car	2.93
4.	Ask for help in a cafeteria	2.91
5.	Turn down help from a passerby who insists on putting your wheelchair in your car for you	2.89
6.	Put at ease people whom you do not know very well after you have had an accidental bowel movement	2.86
7–8.	Tell a friend that it is difficult for you to accept the amount of help that he gives you	2.71
	Turn down an offer to push your wheelchair	2.71
9.	Put people at ease when, while at a party, you discover that your external catheter has popped	2.64
10.	Turn down an offer from a drunk to buy you a drink after he has told you and your friends at a bar how brave he thinks you are	2.56

IV presents the disability-specific social situations used. Responses were videotaped and subsequently rated by trained judges on a number of components of assertion, including duration of eye contact, duration of reply, latency of response, frequency of speech disturbances, compliance to unreasonable requests, requests for new or alternative behavior, and overall assertiveness. Although the videotaped Behavioral Assertiveness Test appears to be able to discriminate between subjects who have gone through social skills training programs and those who have not, it is not yet clear that the role-playing is related to real-life performance (Bellack, Hersen, & Turner, 1978).

External Validity Measures

A few researchers have attempted to use direct behavioral observation outside the experimental situation to provide external validity for assessing social skills. In examining the effects of the disability itself on the social behavior of others, several experimenters have had confederates repeat identical tasks in the general environment as disabled and nondisabled individuals. Bull (1980) examined the effect of the presence or absence of facial scars on how close people came to the confederate on a subway or while waiting to cross a street (situations in which there is usually no requirement for people to interact at all), as well as on the amount of charitable contribution they made to the confederate. Flora & Dybsky (1976) examined the effect of presence or absence of a wheelchair on the amount of unsolicited help a confederate received while executing a number of tasks on a college campus and at a metropolitan shopping

TABLE IV. BEHAVIORAL ASSERTIVENESS TEST:
DISABILITY-SPECIFIC SCENES

Female role model scenes

Narrator:	You see a woman pulling into a parking space reserved for handicapped drivers. The space has a big wheelchair sign over it. The woman rolls down her window and says:
Woman:	"Will it be O.K. if I park here? I'll just be a minute."
Narrator:	You have wheeled out to the parking lot to get into your car. You have just transferred from your chair to the car and are about to put your wheelchair into the back seat. At this point, a woman comes along and offers to help you. After you politely refuse, she insists on helping and says:
Woman:	"Come on, let *me* do that for you. I don't mind helping; it'll be easier for you."
Narrator:	You are in a favorite restaurant with your date. She has just finished giving her order to the waitress. The waitress looks at your date and asks her:
Waitress:	"And what will he have?"
Narrator:	You are at a party and you discover that you external catheter has popped. Another guest notices the wet spot on your slacks:
Guest:	"Did you spill something?"
Narrator:	You are pushing your chair down the hall with no difficulty and a stranger comes up behind you and starts pushing your chair and then says:
Stranger:	"Here, let me *help* you."
Narrator:	You are shopping downtown. A woman comes up to you, puts her hand on your shoulder and says:
Woman:	"Brother, will you pray with me to the Lord and be saved so you can walk again?"

Male role model scenes

Narrator:	You are downtown and have been going in and out of stores looking around. You begin to cross the street but your wheels catch in an iron grating: the chair tilts forward, and before you can regain your balance you fall out of the wheelchair. As soon as you hit the ground you realize that you are not hurt; you are O.K., just surprised. Some people come running over.
Bystander:	"Are you O.K.? What happened? Can I help?
Narrator:	You are by yourself. As you pull your car up in front of the restaurant, you notice that you will need help to get up the high curb at the front door. The parking attendant comes over, gives you your car check stub and says:
Attendant:	"Have a nice evening, sir."
Narrator:	You and a group of your friends are talking about a place to go to hear some good music and have some drinks. Someone suggests a place that you have heard about, but it is not wheelchair accessible and to get in there you will have to be carried up a narrow flight of stairs. It could be done, but it would be a hassle and quite a production. Your friends have helped you in places like this before, but this time you feel that you would like to go someplace where such a fuss would not have to be made:
Friend:	"O.K., it's set. Pick me up in your van and we'll give the other guys a ride so they can help get you in."
Narrator:	You have not seen this friend of yours since you were injured:
Friend:	"Oh, no! I didn't know that you were in a wheelchair! How did it happen? How long are you going to be laid up?"
Narrator:	You are in a hallway looking for a telephone. You finally see one but

TABLE IV (*continued*)

	realize that it is too high for you to reach the coin slot, so you'll need to get some help with the phone. You look around and finally see someone coming down the hall. He looks your way and says:
Passerby:	"Hey, how ya' doin' today?"
Narrator:	You and your date have made plans to go to a play. You've called ahead and explained that you're in a wheelchair. They say that's no problem; you can sit in an aisle and they mail your tickets for that location. Now it's the night of the play and you're sitting on the aisle next to your date. An usher comes over and says:
Usher:	"I'm sorry, sir. You'll have to move to the back. You're in the way here."

center, and Fehr, Dybsky, Wacker, & Kerr (1977) examined the effect of presence or absence of eye contact and direct requests by a disabled individual on the amount of help received while attempting a variety of tasks. McFall and Twentyman (1973) used a confederate to attempt to have subjects accede to unreasonable requests. The dependent measure was the time it took the subject to refuse the increasingly unreasonable requests. All of these techniques suffer from interference either by situational influences, the demand characteristics of the assessment, ethical considerations, or bias from those who know they are being observed (Rich & Schroeder, 1976).

In order to demonstrate the clinical utility of any psychosocial intervention, including social skills training, one must be able to indicate that such training results in a meaningful change in the patient's functioning. Unfortunately, there is at present no agreed-upon variable or set of variables that measure successful rehabilitation outcome or productivity. A few researchers have attempted to use direct behavioral observations outside the experimental situation to provide external validity for assessing social skills. Diaries of assertive behavior (Hedquist & Weinhold, 1970) or of social activities (Mishel, 1978) were required of some subjects in order to provide external criteria for the other measures of assertiveness. In assessing her assertive-training program with handicapped individuals, Mishel (1978) used an activity budget; lists of activities were placed under an "at home" or "outside-of-home" category and rated by the patient as occurring during a particular time of day and as done either alone or with a friend, relative, and/or acquaintance. These recorded activities were further separated into categories depending on the degree of relative freedom one had in performing the activity, for example, discretionary, obligatory, and discretionary-interaction. Although two categories did not show any significant improvement, the significant increases in activities found on the discretionary-interaction, semiobligatory, and social-interaction categories were used as evidence for the transfer of learning to real-life situations.

Two major research efforts are underway that address the issue of

outcome measurement in behavioral terms. The Rehabilitation Indicators Project (RIP; Brown, Caplan, & Swirsky, 1978; Diller, Fordyce, Jacobs, & Brown, 1977, 1978) has focused on developing a lexicon of behaviors that will define the behavioral domain relevant to all rehabilitation efforts. There are status indicators (employment and marital status), activity pattern indicators (cleaning house, going to work, telephoning friends), and skill indicators (uses knife and fork, dresses self). The Longitudinal Functional Assessment System (LFAS; Willems, 1976) has been developed to document behavioral outcomes in rehabilitation, but it approaches the problem differently than the RIP. The LFAS monitors directly whatever the person does in her or his everyday routine and then translates this behavior into a quantitative assessment of performance. Although still in the process of development, it is composed of (1) direct observation of patient behavior while in the hospital, (2) amount of time in bed in the hospital, (3) wheelchair odometer, both in the hospital and after discharge, (4) telephone contact every 10 days to obtain a behavioral diary for that day, (5) a monthly environmental survey to document the extent to which the person can actually use the physical components of the environment, (6) morbidity, the number and kind of medical complications that curtail daily activity during the first year after discharge, and (7) social, vocational, and educational activities. The RIP has attempted to define the domain of behaviors that might be relevant to any rehabilitation case and might provide a standardized terminology that can be used in all rehabilitation centers. The LFAS provides a system of measurement that has demonstrated effectiveness, but it has not emphasized the means for categorizing behaviors for comparison purposes. The RIP can be helpful in defining specific treatment goals in behavioral terms, and the LFAS can assess the person's actual level of performance on these tasks. Obviously, more research and field testing are needed with each.

A rehabilitative "social-mobility" quotient (Herman, Van Horn, & Dunn, 1977) was derived from answers to the following questions: In a month's time (a) how many times do you go out socially, (b) how many times do you entertain socially in your home, (c) how many different people do you interact with socially, and (d) in how many different places do you interact socially? This social-mobility quotient was found to be significantly correlated with patients' subjective ratings of probability of responding in socially sensitive disability-specific situations, staff ratings of adjustment to disability, and several components of a videotaped Behavioral Assertiveness Test.

Although Trieschmann (1978) concludes that the intercorrelations of staff ratings of patient adjustment, self-ratings by patients, multiple measures of success in a rehabilitation center, and psychological-test scores were very low, Dunn (1977) has indicated that the staff rating of the patient can be useful. Dunn asked five staff members who knew patients well to rate them on the basis of "overall adjustment to their disability"

on an arbitrarily chosen 11-point scale. A high positive correlation among raters and a statistically significant negative correlation between patient self-reported anxiety and rated overall adjustment were found. In a subsequent study, the staff ratings of adjustment to disability were significantly correlated with social mobility, age, length of injury, and overall assertion on the Behavioral Assertiveness Test (Herman et al, 1977). In a recent dissertation, Ginsburg (1978) asked staff as well as significant others to rate patients on how assertive they were and to rate their assertion levels as compared to other wheelchair-bound individuals.

It would appear, then, that there is no single measure of social skillfulness, nor is there agreement on what constitutes external-validity criteria or what determines degree or level of rehabilitation obtained. Multiple measures of social skillfulness, as well as outcome data, need to be taken, and further studies need to be carried out, to determine the relationships between these measures.

Correlation of Objective and Subjective Measures

In an attempt at investigating the relationships between objective and subjective measures of social skillfulness in both general and disability-specific social situations, Herman, Dunn, Van Horn, and de Montmollin (1977) and Herman, Van Horn, and Dunn (1977) assessed 30 male spinal cord–injured veterans on the Assertion Inventory (Gambrill & Richey, 1975), the Assertiveness Schedule (Rathus, 1973b), the Spinal Cord Injury Assertiveness Questionnaire (Table I), and the Videotaped Behavioral Assertiveness Tests (Eisler, Miller & Hersen, 1973; Herman, Dunn, Van Horn, & de Montmollin, 1977; Herman, Van Horn, & Dunn, 1977; Hersen *et al.*, 1974). In addition, data were collected on demographic variables such as age and level and length of time of injury, as well as outcome variables (staff ratings of adjustment to disability and a social-mobility quotient). As a group, the spinal cord–injured patients reported themselves to be more generally assertive on both the Rathus and Gambrill measures than other groups previously reported in the literature. In fact, the data resembled that of groups of college students after they had received assertiveness training (Gambrill & Richey, 1975; Rathus, 1973a). In addition, patients reported being more assertive on the Gambrill measure than did several groups of drug- and alcohol-abusing patients who varied on their current level of addiction and also a group of general medical and surgical patients, who more closely resembled the spinal cord–injured group demographically (de Montmollin *et al.*, 1978). Nevertheless, the range of scores on both the Rathus and Gambrill measures indicates that many of the patients did indeed report problems with general assertiveness and also reported that they would be anxious if confronted with those situations in real life. Eight of 30 patients had negative scores on the Rathus measure, indicating quite a low level of generalized assertion. Classifying patients into groups based on mean

scores from both the anxiety–discomfort and response probability scales of the Gambrill measure yielded four profiles: assertive (low anxiety and high response); anxious (high anxiety and high response); depressed or do not care (low anxiety and low response); and unassertive (high anxiety and low response). Ten patients were categorized as assertive, and seven as unassertive; both the anxious performers ($N = 5$) and the depressed group ($N = 8$) can be considered intervention targets. Thus, in total, 33% reported themselves as being assertive, whereas 67% appear to have been in need of intervention. Of course, this does not take into account those patients who were classified as being assertive but who selected specific individual item(s) for intervention as well. Categorizing patients on the basis of their SCIAQ scores indicated that 12 (40%) were assertive, whereas 60% could be considered as targets for further intervention. In terms of consistency, 16 of 30 patients were categorized in the same manner using the Gambrill measure and the SCIAQ.

Results from the Behavioral Assertiveness Tests were somewhat difficult to summarize, but it seemed that the behaviors rated as being most unassertive were in disability-specific scenes and appeared to be in scenes dealing with elimination functions and questions concerning the disability itself. Another trend that appeared concerned the consequences of making or not making an assertive response. If one assumes that the probability of being responded to favorably increases with assertiveness, then certain items call for an assertive response, especially if one needs assistance (i.e., help with the phone, help up the curb, getting the right change). Apparently, these types of items received higher assertive scores than those items whose outcomes were more probably dependent on individual taste (i.e., may be discretionary). Spinal cord–injured patients appear to be able to respond assertively in order to have their physical needs met. They appear less responsive in other areas of assertive expression and in situations where an obvious response direction is not apparent.

Table V presents a summary of the intercorrelations of the objective and subjective measures of assertion, demographic variables and outcome measures. The following is a brief summary of the significant correlations for the measures. For the demographic variables, age, length of time of injury, and staff ratings of adjustment appear to be related. Level of injury did not appear to be significantly related to any other variable. For the outcome variables, staff ratings of adjustment to disability appeared related to age and the social-mobility index. Social mobility was related to self-reported responsiveness in disability-specific situations, which is a partial validity indicator for the SCIAQ. In addition, social mobility was related to requests for new behavior, overall assertiveness, and the composite of the videotape ratings of the Behavioral Assertiveness Tests (BAT). For the self-report measures, the Rathus measure appeared highly correlated with the Gambrill Response Probability Scale and, to a lesser degree, with the composite ratings of the BAT. High anxiety varied with

TABLE V. INTERCORRELATIONS OF OBJECTIVE AND SUBJECTIVE MEASURES OF ASSERTION, DEMOGRAPHIC VARIABLES, AND OUTCOME MEASURES

	Rathus	SCIAQ, anxiety	SCIAQ, response probability	Gambrill, anxiety	Gambrill, response probability	BAT, compliance	BAT, requests	BAT, overall assertiveness	Age	Length of time of injury	Level of injury	Rated adjustment	Social mobility
Subjective measures													
Rathus													
SCIAQ, anxiety	.054												
SCIAQ, response probability	−.292	.201											
Gambrill, anxiety	−.279	.607[b]	.469[b]										
Gambrill, response probability	−.518[b]	.187	.516[b]	.443[c]									
Objective measures													
BAT, compliance	.316	−.300	−.095	−.170	−.219								
BAT, requests	.199	.028	−.395[c]	.013	−.263	.072							
BAT, overall assertiveness	.303	−.336	−.224	−.630[b]	−.284	.315	.178						
Demographic variables													
Age	−.456[c]	.004	.003	−.102	.106	−.081	−.122	.051					
Length of time of injury	−.314	−.047	−.136	−.165	.007	−.328	.034	.142	.618[b]				
Level of injury	.082	−.276	.009	−.143	−.053	.159	−.168	−.064	.192	.033			
Outcome variables													
Rated adjustment	−.146	−.271	−.241	−.331	.064	−.112	−.046	.333	.414[c]	.588[b]	.163		
Social mobility	.291	−.213	−.410[c]	−.297	−.288	.247	.368[c]	.465[b]	.037	.288	.149	.445[c]	

Note: df = 28.

[a] Low score = more assertiveness.

[b] p < .01 (.463).

[c] p < .05 (.361).

low response probability on the Gambrill scales; the anxiety–discomfort scale was similarly related to the scales of the SCIAQ. The Gambrill anxiety scale was negatively associated with the composite rating on the BAT. The Gambrill response probability scale was related to generalized assertion (Rathus), responsiveness in disability-specific situations, and selected measures of the BAT. The SCIAQ was related to the Gambrill measure in the anxiety subscales. The SCIAQ response probability score was related to social anxiety and social responsiveness (Gambrill). More importantly, it was related to social mobility and requests for new behavior on the BAT. In general, the videotape ratings appeared to be somewhat separate from the subjective self-report measures, except as noted above. Requests for new behavior were related to subjective reports of responsiveness, especially in disability-specific areas, as well as the social-mobility index. Overall assertiveness was related to low levels of self-reported anxiety in general social situations as well as social mobility. Inspection of some of the subcategory correlations suggests interactional and differential effects between male and female confederates as well as type (general social or disability-specific) of situation. The situational specificity of assertiveness pointed out by Eisler, Hersen, Miller, and Blanchard (1975) is supported by these results.

CURRENT PRACTICE IN SOCIAL SKILLS TRAINING:

Techniques in social skills training have been extensively investigated in college students and psychiatric patients and reviewed by Heimberg, Montgomery, Madsen, and Heimberg (1977), Rich and Schroeder (1976), and Lange and Jakubowski, (1976), all of whom concluded that treatment procedures combining behavior rehearsal (role-playing the response), modeling (observing a live or filmed model performing the response), and coaching (live or videotaped feedback and instructions on the quality of the response) are effective treatments and superior to no-treatment controls. Use of these techniques with physically handicapped patients has not been extensively investigated but will be reviewed here.

One excellent theoretical analysis of the social psychology of physical disability and several recent papers have suggested some specific techniques by which the physically handicapped can deal more effectively with their social environments. According to Kelley et al. (1960), to compensate for the standardized and attenuated social feedback received from the nonhandicapped, handicapped individuals might attempt a number of strategies: (1) They can try to get information about people's true attitudes by concealing the disability. This tactic has the disadvantage of embarrassing the other people when disabilities are revealed. (2) They can attempt to "test the limits" by "demanding increasing amounts of help and feedback from others" (Kelley et al., 1960, p. 190). This may result in the excessive dependency and passivity seen in some physically

handicapped individuals. (3) They can openly and explicitly reveal their own feelings in order to elicit the same from others. The self-disclosure literature (Cozby, 1973) suggests that this is a viable technique, and Hastorf, Wildfogel, and Cassman (1979) have demonstrated that in social interactions the acknowledgment of handicaps by handicapped persons helps to reduce discomfort and uncertainty in the persons with whom they are interacting. Fehr *et al.* (1977) have shown that direct requests for assistance and eye contact serve to increase the frequency of obtaining help.

However, systematic application and evaluation of social skills assessment and training procedures with the physically handicapped have only recently been utilized. Romano (1975) first used these procedures in a medical rehabilitation setting, but only impressions were reported. Dunn, Van Horn, and Herman (1976) developed a videotape[1] specifically for use in social skills training with spinal cord–injured individuals. As a result of a survey of 40 spinal cord–injured individuals (Dunn, 1977) eight potentially sensitive social situations involving the disability were selected as being the most anxiety provoking and/or problematical to manage. A 30-minute teaching film was made for the purpose of demonstrating these scenes as well as suggesting alternative appropriate styles of responding to each. The tape is divided into the following four major situational themes, each being illustrated by two vignettes: (1) refusing help (putting a wheelchair into a car and refusing social advances); (2) asking for help (asking for assistance in making a phone call and asking people to move out of the way); (3) embarrassing situations (falling out of the wheelchair and coping with an accidental bowel movement in public); and (4) familiar situations (responding to a waitress and picking up a girl in a bar). Each vignette depicts the general situation, as well as an aggressive, a passive, and an assertive style of responding. Each scene is followed by a commentary that points out significant behavioral and verbal components of the different responses. The commentary emphasizes (1) that it is up to the person in the wheelchair to help people become more comfortable with the handicap, (2) that if the spinal cord–injured individual acts like a "cripple," he will be treated like one, and (3) that an active, assertive approach most often results in the most favorable overall consequences for all parties involved. This tape appears to meet Bandura's (1971) requirements for a good modeling tape including vividness, novelty, several models of the same age and sex as the observer, models being rewarded for being assertive, and narration that focuses on relevant aspects of the behavior to be modeled.

Aside from use in therapy (both individual and group) with spinal cord–injured individuals and/or their significant others, the tape has

[1]For information concerning distribution, inquiries should be addressed to Order Department, National Audio Visual Center, Re: N.A.C. number 004-179, Washington, D.C. 20409.

been found appropriate for staff training and education of volunteers as well as the general public. Preliminary evaluation of the tape (Dunn *et al.*, 1981; Herman, Van Horn & Dunn, 1977) indicates, however, that, unless presented in the context of a formal, ongoing program involving discussion and feedback, patient anxiety and subsequent performance is adversely affected.

Mishel (1978) compared a group of handicapped adults who received verbal feedback (2 of the 15 sessions used videotaped feedback as well) with a waiting-list control group on a number of behavioral and self-report measures of assertiveness. On a Behavior Assertiveness Test, the treatment group showed a significant improvement on sentence interruptions and length of hesitations as well as the content categories that reflected an unwillingness to accept blame. Overall ratings of speech disturbances and assertive content, however, showed no significant differences. Self-reported anxiety in those situations requiring assertive responses decreased and the number of self-reported social interactions increased in the treatment group.

Two recent dissertations (Gallenberger, 1979; Ginsburg, 1978) have also investigated the applicability of assertiveness training in spinal cord–injured patients (SCI). Ginsburg (1978) assessed wheelchair-bound individuals who had not yet completed their rehabilitation and vocational-rehabilitation patients who were referred by counselors on the basis of need for assertiveness on a number of attitudinal and observational measures. In addition, rehabilitation staff and significant others rated the patients on an assertiveness scale. After the initial assessment, patients either (1) listened to each of 21 audiotaped situations and gave four "ideal" responses to each situation (rehearsal), (2) listened to 21 audiotaped situations and four appropriate assertive responses (modeling), or (3) were put on a waiting list (control). In comparison with the control group, both the rehearsal and the modeling groups increased in the behavioral ratings of assertiveness and knowledge of the most effective response, but neither showed differences in subjective comfort. The modeling procedure was reported to be more effective than the rehearsal procedure in increasing assertive behavior in situations in which the subjects had little initial knowledge of what was assertive, whereas the rehearsal procedure was better in situations in which the subjects reported being uncomfortable. This suggests that modeling might be more beneficial in SCI-specific situations (e.g., accidental bowel movements) where the subject, prior to injury, had no knowledge of the assertive response. On the other hand, behavior rehearsal might be more beneficial in more general social situations where the appropriate response is known but anxiety interferes with its performance. A similar explanation has been proposed by Heimberg *et al.* (1977) for preliminary findings that college students only need rehearsal procedures, whereas psychiatric patients (who presumably possess less knowledge of the appropriate response) benefit more from a

combination of modeling and rehearsal. When the subjects from both treatment conditions were combined and compared with the control group (Ginsburg, 1978), the treatment subjects showed an increase in assertive behavior but no change in perceived comfort as compared to the control group. This result is similar to the work of Dunn et al. (1981), who found no significant differences in anxiety or responsiveness in the treatment groups when self-report measures were examined.

Gallenberger's (1979) study compared (1) an assertion-training group that received videotaped peer modeling, instructions, behavioral rehearsal, and feedback, (2) an instruction-only group in which patients were instructed and encouraged to try to behave more assertively, and (3) a test–retest control group. Both assertiveness training and encouragement appeared to offset the debilitating effects of hospitalization on behavior; if this is the treatment goal, then encouragement and heightened awareness would appear to be the more cost-efficient approach. However, in the long-term analysis (3-month follow-up), only the assertiveness-training group generalized to *in vivo* situations (self-reports of frequency of social interactions and assertive responding) and maintained significant changes after discharge. Although encouragement may be adequate to alter an individual's behavior in these training situations, it does not appear adequate to instigate behavioral changes in situations where that encouragement is no longer present.

Pilot work recently completed at the Miami Veterans Administration (VA) Medical Center (Dunn et al., 1981) assessed 22 male spinal cord–injured inpatients and outpatients with three self-report measures of social skillfulness and a performance measure adapted from Eisler, Hersen, and Miller (1973); the measures required the patients to respond to a number of social situations that previous research (Dunn, 1977; Herman, Dunn, Van Horn, & de Montmollon, 1977; Herman, Van Horn, & Dunn, 1977) had shown to be potentially difficult to manage. These responses were videotaped and rated on a number of components of assertiveness. Six of these patients, designated the social skills group, then participated in a 4-week course that met for two 1½-hour sessions per week consisting of instruction, behavioral rehearsal, and videotape feedback. Besides providing models for the other group members, videotape feedback had the following additional advantages: (1) precision in defining and measuring behavior; (2) objective and less threatening information on the subject's own response; (3) provision of feedback on the nonverbal aspects of behavior; and (4) high patient acceptance (Dunn et al., 1981; Galassi, Galassi, & Litz, 1974). Videotaped feedback has been shown to be effective for behavior change in group psychotherapy (Robinson & Jacobs, 1970), to be an important aspect of group assertion training (Galassi et al., 1974) and to be useful in accelerating the process of psychotherapy (Resnikoff, Kagan, & Schauble, 1970). In rehabilitation, Alexander and Goodrich (1978) have shown that gait training is facili-

tated by videotape feedback, but few other rehabilitation applications have been reported. Six patients in the Dunn et al. (1979) study, designated the film-only group, waited four weeks and then saw a film that showed aggressive, passive, and assertive ways of dealing with eight of the most difficult situations (Dunn, et al., 1976). Four patients, designated the film + social skills group, received the same procedures as the social skills group but, in addition, at the end of the session, saw the part of the film that corresponded to the particular difficult situation covered during that session. The remaining six patients, designated the control group, experienced only the traditional ward milieu. At the end of the 4 weeks, all 22 patients were retested using the same measures. No statistically significant differences were found among the groups on the self-report measures, although there was a trend for the social skills and the film + social skills groups to report an increase in response probability and a decrease in anxiety. On the Behavioral Assertiveness Test, however, several statistically significant differences appeared. On overall assertiveness (as rated with approximately 0.8 reliability by two judges blind to group membership and time of testing), the film + social skills group was rated significantly higher in the posttest assessment than the film-only and control groups, whereas the social skills group was rated significantly higher than the other three groups on requests for new behavior and noncompliance.

An unexpected result was found on responses to the Behavioral Assertiveness Test in relation to the sex of the confederate to whom the patient must respond and the type of scene (either general social situations or disability specific). On all three behavioral performance measures, the patients were judged more assertive with male confederates than with female ones, except for noncompliance in disability-specific scenes. These results held true across times of testing and across groups. It is unclear at this time whether this result is due to a general lack of assertiveness with women in the male veteran population or to the fact that women are the primary care givers in rehabilitation hospitals and patients learn to be noncompliant in disability-related situations and nonassertive in general social situations. The former explanation is less likely, however, considering the finding of Eisler et al. (1975) that male VA psychiatric patients were more assertive with women. Further research is indicated to determine not only the effect of sex, familiarity, and type of assertive response (Positive or negative) but also the effect of type of situation, sociocultural background, type of disability, and geographical background. The latter variable has been shown to be important by the fact that, in the reliability data on the SCIAQ, different VA hospitals in different parts of the country showed different rank orders of anxiety-arousing items, with each hospital having unique situations that caused difficulties.

Although based on a small number of subjects and limited by dif-

ferences in procedures, the studies just discussed seem to support the view that specific training in the management of potentially difficult social situations can lead to increased social skills and improved rehabilitation outcome for physically limited individuals.

SOCIAL SKILLS AND MEDICAL DISABILITIES

There appear to be a number of ways of looking at the relationship between social skills and a multitude of medical disorders. Rusalem (1973) has suggested that a general deficiency in social skills is a result of the social isolation that often accompanies disabilities, particularly disabilities that limit mobility. Although some individuals with medical problems may have generally low interpersonal skills, others may only have difficulties in those social situations that are unique to their disabilities. Those that are disabled early in childhood may not have had the opportunity to develop normal social skills and may be interpersonally deficient in any given situation (Richardson, 1963), whereas newly disabled individuals, with wide variability in their general social skillfulness, may not yet have developed those skills needed in dealing with situations that arise because of the disabilities (Safilios-Rothschild, 1970). Still another possibility is that social skills deficits are in some manner related to the possible generation and/or maintenance of the medical disability itself.

Clinicians have noted that patients with essential hypertension appear as a group to be overly inhibited in the appropriate expression of anger and anxiety (Schwartz & Shapiro, 1973). In exploring the coronary-prone behavior pattern (type A), Jenkins, Zyzanski, Ryan, Flesseas, and Tannenbaum (1977) noted that Type A men with more serious coronary atherosclerosis are often uncomfortable in their interpersonal relationships. They appear especially awkward and insecure in groups and appear to obtain their rewards in life from seeking achievement rather than from socializing with people. Nemiah and Sifneos (1970) indicate that patients with certain diseases, coronary ischemia and rheumatoid arthritis, for example, have difficulty expressing emotion. Fox (1978) indicates that cancer patients have been described as having poor outlets for emotional discharge, reduced aggressive expression, and diminished introspection and self-awareness. Wooley, Blackwell, Glaudin, and Lipkin (1973) found that chronic-illness behavior (CIB) patients were significantly less likely to engage in assertive behaviors and significantly more likely to experience anxiety being assertive than matched non-CIB patients and nonpatients. In addition, CIB patients were significantly less likely to request behavior change than a nonpatient control group (Wooley & Blackwell, 1975). Several investigators have also indicated that level of social skillfulness in both general and addictive social situations is related to level of

abstinence in both alcoholic and drug-addicted patients (Chaney,O'Leary, & Marlatt, 1978; de Montmollin *et al.*, 1978; Van Hasselt, Hersen, & Milliones, 1979).

It is obvious that a large number of retrospective and prospective studies need to be carried out in order to solidify the relationship between social skillfulness and medical disorders. It would be inappropriate at the present time to consider that improving social skills in these patients would directly alter their medical conditions. However, as a self-control coping strategy, the use of assertive–social skills training, modeling, and role-playing as one component of an overall treatment program to teach patients how to recognize anger–fear situations and express their feelings in a psychologically and physiologically adaptive fashion would indeed be most appropriate (Schwartz & Shapiro, 1973). These techniques can be viewed as one component of a multifaceted treatment package. Obesity patients and those with specific diet restrictions, for example, might increase their compliance if they were given training in the social skills of "thinness" (i.e., refusing food, requesting special items not on a menu, suggesting alternative social activities without food involvement). Smoking-control, as well as pulmonary, patients might become more effective practicing refusal of cigarettes and requesting that others refrain from smoking in their presence. Patients with chronic medical conditions might benefit from training in more effective communication with physicians, especially in reducing anxiety from "misunderstood" comments about their disorders, their medicines, and their treatments, as well as possible side effects and restrictions. This might be especially appropriate for CIB and pain patients. In addition, pain patients could be taught to talk about their pain more selectively and interact socially without relying on pain and illness as the primary focus. Both the stress reduction and skills enhancement effects of social skills training programs would be of benefit to a wide variety of patients with medical problems. The resultant increase in coping skills can improve rehabilitation outcome, decrease unnecessary use of medical resources, and enable traditional medical treatments to become more effective. In addition, these programs usually have good face validity and receive positive patient and staff acceptance. Because of this, social skills programs might be a useful way to begin to establish broader based behavioral medicine intervention programs, especially in areas where "psychological" input has been previously avoided.

REFERENCES

Albrecht, G., Harasymiw, S. J., & Horne, M. *Social perceptions of disability.* Paper presented at the American Sociological Association meeting, Chicago, Illinois, 1977.

Alexander, J., & Goodrich, R. Videotape immediate playback: A tool in rehabilitation of persons with amputation. *Archives of Physical Medicine and Rehabilitation,* 1978, *59,* 141–144.

American Foundation for the Blind, *What do you do when you see a blind person?* New York, 1975.

Bandura, A. Psychotherapy based on modeling principles. In A. E. Bergin & S. L. Garfield (Eds.), *Handbook of psychotherapy and behavior change.* New York: Wiley, 1971.

Bellack, A. S., Hersen, M., & Turner, S. M. Role play tests for assessing social skills: Are they valid? *Behavior Therapy* 1978, *9,* 448–461.

Brookfield, K. K. *Attitudes of the disabled and non-disabled toward self and toward disabled and normal persons.* Unpublished doctoral dissertation, Columbia University, 1969.

Brown, M., Caplan, J., Swirsky, J. *Rehabilitation indicators: An overview.* Paper presented at the American Psychological Association Convention, Toronto, August 1978.

Bull, R. Prejudice "scar wars." *Psychology Today,* February 1980, p. 106.

Chaney, E., O'Leary, M., & Marlatt, G. Skill training with alcoholics. *Journal of Consulting and Clinical Psychology,* 1978, *46,* 1092–1104.

Cheek, D. K. *Assertive black. . .puzzled white.* San Luis Obispo, Calif.: Impact Publishers, 1976.

Cogswell, B. D. Self socialization: Readjustment of paraplegics in the community. *Journal of Rehabilitation,* 1968, *34,* 11–13.

Comer, R. J., & Piliavin, J. A. The effects of physical deviance upon face to face interaction: The other side. *Journal of Personality and Social Psychology,* 1972, *23,* 33–39.

Cozby, P. C. Self disclosure: A literature review. *Psychological Bulletin,* 1973, *79,* 73–91.

Davis, F. Deviance disavowal: The management of strained interaction by the visibly handicapped. *Social Problems,* 1961, *9,* 120–132.

de Montmollin, J., Herman, S. H., & Rice, W. *The social skills of abstinence.* Paper presented at Southeastern Psychological Association, Atlanta, March 15–18, 1978.

Diller, L., Fordyce, W., Jacobs, D., & Brown, M. *Excerpts from skill indicators.* Rehabilitation Indicators Project, New York University Medical Center, New York, 1977.

Diller, L., Fordyce, W., Jacobs, D., & Brown, M. *Activity pattern indicators.* Rehabilitation Indicators Projects, New York University Medical Center, New York, 1978.

Dixon, J. K. Coping with prejudice: Attitudes of handicapped persons towards the handicapped. *Journal of Chronic Diseases,* 1977, *30,* 307–322.

Dunn, M. Psychological intervention in a SCI center: An introduction. *Rehabilitation Psychology,* 1975, *22,* 165–178.

Dunn, M. Social discomfort in the patient with SCI. *Archives of Physical Medicine and Rehabilitation,* 1977, *58,* 257–260.

Dunn, M., Van Horn, E., & Herman, S. H. *Social skills and the SCI patient* 1976. (#NAC004-179). Videotape available from the National Audio Visual Center, Washington, D.C..

Dunn, M., Van Horn, E., & Herman, S. H. Social skills and SCI: A comparison of three training procedures. *Behavior Therapy,* 1981, *12,* 153–164.

Eisler, R. M., Hersen, M., & Miller, P. M. Effects of modeling on components of assertive behavior. *Journal of Behavior Therapy and Experimental Psychiatry,* 1973, *4,* 1–6.

Eisler, R., Miller, P., & Hersen, M. Components of assertive behavior. *Journal of Clinical Psychology,* 1973, *29,* 295–299.

Eisler, R. M., Hersen, M., Miller, P. M., & Blanchard, F. B. Situational determinants of assertive behaviors. *Journal of Consulting and Clinical Psychology,* 1975, *43,* 330–340.

Fehr, M. J., Dybsky, A., Wacker, D., & Kerr, J. *Eye contact in the social skills of obtaining*

help. Paper presented as part of the symposium The Social Skills of Physical Disability, American Psychological Association, San Francisco, 1977.

Fensterheim, H., & Baer, J. *Don't say yes when you want to say no*. New York: David McKay, 1975.

Flora, J. A., & Dybsky, A. The wheelchair: A social stimulus for unsolicited help *Rehabilitation Psychology*, 1976, *23*, 109–113.

Fox, B. Premorbid psychological factors as related to cancer incidence. *Journal of Behavioral Medicine*, 1978, *1*, 45–133.

Fredericksen, L. W., Jenkins, J. O., Foy, D. W., & Eisler, R. M. Social skills training to modify abusive verbal outbursts in adults. *Journal of Applied Behavior Analysis*, 1976, *9*, 117–125.

Galassi, J. P., Galassi, M. D., & Litz, M. D. Assertive training in groups using video feedback. *Journal of Counseling Psychology*, 1974, *21*, 390–394.

Gallenberger, C. *Self-monitoring versus group therapy in assertiveness training*. Unpublished doctoral dissertation, Memphis State University, 1979.

Gambrill, E. D., & Richey, C. A. An assertion inventory for use in assessment and research. *Behavior Therapy*, 1975, *6*, 350–362.

Ginsburg, M. L. *Assertion with the wheelchair-bound: Measurement and training*. Unpublished doctoral dissertation, University of Connecticut, Storrs, 1978.

Hastorf, A. H., Wildfogel, J., & Cassman, T. Acknowledgment of handicap as a tactic in social interaction. *Journal of Personality and Social Psychology*, 1979, *37*(10), 1790–1797.

Hedquist, F. J., & Weinhold, B. K. Behavioral group counseling with socially anxious and unassertive college students. *Journal of Counseling Psychology*, 1970, *17*, 237–242.

Heimberg, R. G., Montgomery, D., Madsen, C., & Heimberg, J. S. Assertion training: A review of the literature. *Behavior Therapy*, 1977, *8*, 953–971.

Herman, S. H., Dunn, M., Van Horn, E., & de Montmollin, J. *Behavioral validity of general social skills assessment procedures with spinal cord injured individuals*. Paper presented at the eleventh annual Association for Advancement of Behavior Therapy meeting, Atlanta, 1977.

Herman, S. H., Van Horn, E., & Dunn, M. *Behavioral assessment of general and disability specific social skills*. Paper presented at the annual American Psychological Association meeting, in the symposium The Social Skills of Physical Disability, San Francisco, 1977.

Hersen, M., & Bellack, A. S. Social skills training for chronic psychiatric patients: Rationale, research findings and future directions. *Comprehensive Psychiatry*, 1976, *17*, 559–580.

Hersen, M., Eisler, R., & Miller, P. An experimental analysis of generalization in assertion training. *Behavior Research and Therapy*, 1974, *12*, 295–310.

Hirsch, S. M. Assertiveness training with alcoholics. In R. E. Alberti (Ed.) *Assertiveness: Innovation, applications, issues*. San Luis Obispo, Calif., Impact Publishers, 1977.

Hyman, M. D. Social isolation and performance in rehabilitation. *Journal of Chronic Diseases*, 1972, *25*, 85–97.

Jakubowski-Spector, P. Facilitating the growth of women through assertive training. *The Counseling Psychologist*, 1973, *4*, 75–86.

Jenkins, D., Zyzanski, S., Ryan, T., Flesseas, A., & Tannenbaum, S. Social insecurity and coronary-prone type A responses as identifiers of severe atherosclerosis. *Journal of Consulting and Clinical Psychology*, 1977, *45*, 1060–1067.

Kahn, E. Social functioning of the patient with SCI. *Journal of the American Physical Therapy Association*, 1969, *49*, 757–762.

Kelley, H. H., Hastorf, A. H., Jones, E. E., Thibaut, J. W., & Usdane, W. M. Some implications of social psychological theory for research on the handicapped, In L. H. Lofquist (Ed.), *Psychological research and rehabilitation*. American Psychological Association, Miami: 1960.

Kleck, R. Emotional arousal in interactions with stimatized persons. *Psychological Reports,* 1966, *21,* 12–26.

Kleck, R. Physical stigma and nonverbal cues emitted in face-to-face interactions. *Human Relations,* 1968, *21,* 19–28.

Kleck, R., Ono, H., & Hastorf, A. The effects of physical deviance upon face-to-face interactions. *Human Relations,* 1966, *19,* 425–436.

Ladieu-Leviton, G., Adler, D. L., & Dembo, T. Studies in adjustment to visible injury: Social acceptance of the injured. *Journal of Social Issues,* 1948, *4,* 55–61.

Lange, A. J., & Jakubowski, P. *Responsible assertive behavior.* Champaign, Ill.: Research Press, 1976.

MacDonald, M. L., Lindquist, C. U., Kramer, J. A., McGrath, R. A., & Rhyne, L. D. Social skills training: Behavioral rehearsal in groups and dating skills. *Journal of Counseling Psychology,* 1975, *22,* 224–239.

McFall, R. M., & Marston, A. R. An experimental investigation of behavior rehearsal in assertive training. *Journal of Abnormal Psychology,* 1970, *76,* 295–303.

McFall, R. M., & Twentyman, C. T. Four experiments on the relative contribution of rehearsal, modeling, and coaching to assertion training. *Journal of Abnormal Psychology,* 1973, *81,* 199--218.

Mesard, L., Carmody, A., Mannarino, E., & Ruge, D. Survival after spinal cord trauma: A lifetable analysis. *Archives of Neurology,* 1978, *35,* 78–83.

Mishel, M. H. Assertion training with handicapped persons. *Journal of Counseling Psychology,* 1978, *25,* 238–241.

Morgan, E. D. (Ed.). *A source book: Rehabilitating the person with spinal cord injury.* V.A. Superintendent of Documents, U.A. Government Printing Office, Stock No. 5100-00063, 1972.

Muzekari, L. H., & Kamis, E. The effects of videotape feedback and modeling on the behavior of chronic schizophrenics. *Journal of Clinical Psychology,* 1973, *29,* 313–316.

Nemiah, J., & Sifneos, P. Affect and fantasy in patients with psychosomatic disorders. In O. Hill (Ed.), *Modern trends in psychosomatic disorders.* New York: Appleton-Century-Crofts, 1970.

Rathus, S. A. Investigation of assertive behavior through videotape mediated assertive models and directed practice. *Behavior Research and Therapy,* 1973, *11,* 57–65. (a)

Rathus, S. A. A thirty item schedule for assessing assertive behavior. *Behavior Therapy,* 1973, *4,* 398–406. (b)

Resnikoff, A., Kagan, N., & Schauble, P. G. Acceleration of psychotherapy through stimulated videotape recall. *American Journal of Psychotherapy,* 1970, *24,* 102–111.

Rich, A. R., & Schroeder, H. E. Research issues in assertiveness training. *Psychological Bulletin,* 1976, *83,* 1081–1096.

Richardson, S. A. Some social psychological consequences of handicapping. *Pediatrics,* 1963, *32,* 291–297.

Robinson, M., & Jacobs, A. Focussed videotape feedback and behavior change in group psychotherapy. *Psychotherapy: Theory, Research, and Practice,* 1970, *7,* 169–172.

Romano, M. D. Social skills rehabilitation with the newly-handicapped. *Archives of Physical Medicine and Rehabilitation,* 1975, *56,* 559. (Abstract).

Rusalem, H. The homebound. In J. F. Garrett & E. S. Levine (Eds.), *Rehabilitation practices with the disabled.* New York: Columbia University Press, 1973.

Safilios-Rothschild, C. *The sociology and social psychology of disability and rehabilitation.* New York: Random House, 1970.

Salter, A. *Conditional reflex therapy.* New York: Dial Press, 1949.

Schwartz, G. E., & Shapiro, D. Biofeedback and essential hypertension: Current findings and theoretical concerns. *Seminars in Psychiatry,* 1973, *5,* 493–503.

Smith, M. J. *When I say no I feel guilty.* New York: Dial Press, 1975.

Trieschmann, R. B. *Spinal cord injuries: Psychological, social, and vocational adjustment.* New York: Pergamon Press, 1980.

Van Hasselt, V., Hersen, M., & Milliones, J. Social skills training for alcoholics and drug addicts: A review. *Addictive Behaviors*, 1979, *3*, 221–233.

Weinberg, N. Social stereotyping of the physically handicapped. *Rehabilitation Psychology*, 1976, *23*(4), 115–124.

Willems, E. *Longitudinal analysis of patient behavior.* Annual report of research activity, Texas Institute for Rehabilitation and Research, Houston, June 1976.

Wolpe, J. *Psychotherapy by reciprocal inhibition.* Palo Alto, Calif.: Stanford University Press, 1958.

Wolpe, J., & Lazarus, A. *Behavior therapy techniques: A guide to the treatment of neuroses.* New York: Pergamon Press, 1966.

Wooley, S. C., & Blackwell, B. A behavioral probe into social contingencies on a psychosomatic ward. *Journal of Applied Behavioral Analysis*, 1975, *8*, 337–339.

Wooley, S. C., Blackwell, B., Glaudin, V., & Lipkin, J. A new behavioral approach to psychosomatic medicine. Paper presented to the Academy of Psychosomatic Medicine, Williamsburg, Va., November 1973.

Yuker, H. E., Block, J. R., & Young, J. H. *The measurement of attidutes towards disabled persons.* Albertson, N.Y.: Human Resources Center, 1966.

CHAPTER 7

Muscle Training

Susan J. Middaugh

INTRODUCTION

The use of behavioral methods in muscle training dates from the early
years of behavioral psychology, both for neuromuscular reeducation in
physical rehabilitation (Franz, 1923) and for deep muscle relaxation in
psychotherapy (Jacobson, 1938). Despite this long history, widespread use
of behavioral approaches in therapeutic exercise is a relatively recent
development, and much of the relevant work has been published within
the past decade. The purpose of this chapter is to present an overview of
this body of work with an emphasis on reported clinical applications of
behavioral principles and procedures in neuromuscular reeducation.

General Areas of Clinical Application

There are four broad categories of problems for which therapeutic
exercise procedures are appropriate and for which behavioral approaches
to muscle training have been reported to be effective for improvement of
strength, relaxation, and coordinated control.

Normal Muscles

Normal muscles can be the focus of muscle training efforts to im-
prove strength or control to meet increased demands or serve new

functions. This training can be straightforward, as in the strengthening of unaffected arm muscles in paraplegic individuals to meet the demands of crutch walking or wheelchair propulsion. Training can also be quite complex, as in the reeducation of a wrist extensor muscle that has been surgically transposed to serve as a finger or thumb flexor. Behavioral procedures have been applied and reported effective in both instances (Brudny, Korein, Grynbaum, Friedmann, Weinstein, Sachs-Frankel & Belandres, 1976; Trotter & Inman, 1968).

Neurological Disorders

Behavioral procedures have been incorporated into therapeutic exercise programs designed to correct neuromuscular dysfunction due to nervous system damage, with reported success (Fernando & Basmajian, 1978; Inglis, Campbell, & Donald, 1976). In some cases the site of damage has been within the central nervous system, impairing the function of the upper motor neuron and interrelated motor control systems, as in cerebral palsy, cerebrovascular accident (stroke), movement disorders, and spinal cord injury. With such CNS impairment, both weakness (paresis) and hyperactivity (spasticity, involuntary movements, tremor) can be present and can serve as the focus of neuromuscular reeducation efforts. In other cases the site of damage has been the lower motor neuron and the peripheral nerves, as in polio, Guillain-Barré, Bell's palsy, and traumatic peripheral nerve injury. With lower motor neuron injury, the paresis is flaccid rather than spastic and the therapeutic goal is to increase strength.

Musculoskeletal Disorders

Behavioral procedures are being applied in a variety of instances in which there are muscle symptoms with no demonstrable CNS or PNS damage. In these applications, the focus of therapeutic exercise is disuse atrophy and protective or irritative muscle contractions referred to as muscle splinting or spasm. These muscle symptoms can be found with trauma to the muscle, tendon, or joint (Jacobs & Felton, 1969; Kukulka, Brown, & Basmajian, 1975; Sprenger, Carlson, & Wessman, 1979); arthritic and rheumatic disorders (Achterberg, McGraw & Lawlis, 1981); and muscle strain or habitual overuse (Kravitz, Moore, Glaros, & Stauffer, 1978; Reavley, 1975). Often the precise etiology is unknown (Nouwen & Solinger, 1979; Phillips, 1978). Psychological factors such as emotional stress and secondary gain are commonly considered to be contributory factors in some, and possibly most, of these conditions.

Psychological and Psychophysiological Disorders

Behavioral procedures are also used for training deep muscle relaxation; such procedures have become widespread in psychotherapy and

treatment of many psychophysiological disorders. In many of these instances, the primary therapeutic interest is not in altering muscle symptoms *per se* but rather in using striate muscle relaxation as a method of altering generalized physiological arousal and emotional affect (Fee & Girdano, 1978; Garrison, 1978; Marshall & Watts, 1976). In this sense muscle training serves as a muscular means of obtaining a nonmuscular goal. These procedures are discussed in more detail elsewhere (Chapter 4, this volume).

The preceding categorizations present some clinically relevant distinctions that are important when discussing muscle-training procedures. It should be kept in mind, however, that an individual patient may have problems in several of these categories. An incomplete paraplegic, for example, might need strengthening of normal muscles, retraining of paretic muscles, and psychotherapeutic intervention for management of pain or stress. Furthermore, a single muscle-training procedure can be applied to problems in more than one category. Variations of progressive muscle relaxation, for example, are not only used in management of psychological and psychophysiological disorders but have long been used as therapeutic exercise for reduction of spasticity and athetoid movements.

Dependent Variables and Levels of Measurement

The dependent variables measuring changes as a result of muscle training can involve measurement at three different levels.

The dependent variables can measure changes at the level of the muscle contraction. The electrical activity generated by the contracting muscle fibers is sometimes measured electromyographically with indwelling electrodes inserted into the muscle or with surface electrodes placed on the skin over the muscle belly. Alternatively, the force generated by the contracting muscle fibers can be measured in grams or kilograms (Basmajian, Kukulka, Narayan, & Takebe, 1975); such a pull generated by actively contracting muscle fibers is correctly termed muscle tension. This is worth emphasizing since muscle tension is so often confused with nervous tension or with tightness of the muscle, which can be caused by such factors as edema, fibrosis, connective tissue contractures, or stretching of the muscle due to poor posture.

The second level of dependent-variable measurement is change at the level of movement or posture. Movement at a single joint can be measured in degrees and referred to as the range of motion (ROM). Posture can be measured in terms of degrees of deviation from a reference point such as body midline. Manual muscle tests provide qualitative ratings of muscle strength based on the capacity to produce movements against gravity or manual resistance (Daniels, Williams, & Worthingham, 1972). Measures such as these assess the action of a single muscle or, more often, the interaction of several muscles.

Finally, the dependent variable can measure change at the level of

complex function. Activities of Daily Living (ADL) measures can be used to assess ability to perform the basic self-care activities of daily living such as dressing, grooming, and eating. Gait measures can be used to evaluate ability to walk. Manual dexterity tasks or tests can be used to measure complex hand function. Measures such as these are often used to determine whether the gains made with muscle training have transferred to performance outside the immediate training situation and generalized to tasks other than the training task.

Levels of Training

Training can also be carried out at the same three levels as measurement. Training can be conducted at the level of the muscle contraction, as in relaxation procedures and procedures designed to increase muscle strength, at the level of movement or posture, as in procedures training joint ROM (Bowman, Baker, & Waters, 1979) or head position (Harris, Spelman, & Hymer, 1974), and at the level of complex function, as when efforts are made to train muscles or movements in the context in which they will ultimately be used in daily activities. Training and procedures designed to improve control of the anterior tibialis muscle while walking (Basmajian *et al.*, 1975) and to maintain muscle relaxation during daily activities are common examples of the third level.

It is important to consider both the level of measurement and the level of function when evaluating the outcome of a muscle-training procedure. The outcome should be measured at the level that training was carried out and caution must be exercised when inferring change at one level from measurement at a second level. There are numerous examples in the relaxation literature where progressive muscle relaxation has been used but no direct assessment of muscle relaxation (electomyographically) has been made. In such a case, it is difficult to conclude that change on another measure such as a pain rating scale or a medication record was related in any way to muscle relaxation.

Behavioral Approaches to Muscle Training

Studies that examine behavioral approaches to muscle training are based on four areas of behavioral psychology: operant conditioning, motor skills learning, progressive muscle relaxation, and biofeedback. Although clinical applications based on these four areas will be considered separately here in order to highlight differences in historical and theoretical orientations, this separation is artificial. Many current clinical applications combine elements from more than one area. All of the studies reviewed have one thing in common. They all systematically apply knowledge of learning processes to therapeutic exercise, both for training the improved use of normal muscles and for retraining the use of dysfunctional muscles.

OPERANT APPROACHES TO MUSCLE TRAINING

Operant conditioning procedures have long been used in physical rehabilitation programs with considerable success (Fordyce, 1971; Ince, Brucker, & Alba, 1976). The large majority of such studies, however, have dealt with problem behaviors such as persistent complaining, poor attendance at therapeutic sessions, and poor task adherence. Operant procedures to correct behaviors that interfere with the ongoing rehabilitation process are certainly valuable and can be expected to improve treatment outcome, but only up to the level ordinarily expected in a patient who is participating fully in the same rehabilitation program.

Of considerably more interest in a chapter on muscle training are the relatively few studies in which operant procedures intervene more directly in the therapeutic exercise process in order to improve treatment outcome in normally cooperative patients. In these studies, operant procedures are viewed as actively guiding and improving the motor learning process through clear specification of the training task, reduction of the task into a series of achievable steps, use of appropriate response-contingent reinforcement, and objective documentation of progress.

Operant Procedures in Training of Normal Muscles

Several studies have been reported in which operant procedures have been employed to improve strength and control in normal muscles. In an excellent study by Trotter and Inman (1968), an operant procedure was used to strengthen normal arm muscles (biceps and triceps) in adult spinal cord-injured individuals. Twenty-four spinal cord–injured patients were paired with respect to subject characteristics such as extent of injury, muscle strength, and sex. One member of each pair was placed in an experimental group and one in a control group. All patients participated in the same progressive resistive exercise program, and improvement was measured as the increase in weight that could be lifted through 10 repetitions, assessed on a weekly basis over 4 weeks of training. The experimental group was treated according to a planned program of positive reinforcement. They were praised by their therapist during daily exercise sessions, weekly weight-lifting gains were charted in their presence, and the weight-lifting gains were related to functional activities requiring increased muscle strength such as crutch walking. The control group worked on the same weight-lifting program under normal treatment conditions, that is, without systematic use of praise, progress charting, or extra emphasis on task relevance. The average weight-lifting increase was 10.29 pounds for the experimental group and 2.40 pounds for the control group, a difference that was statistically significant ($p < .001$). The authors concluded that operant conditioning principles would appear to be effective in rehabilitation settings and should have considerable importance for patient learning.

Trombly (1966) reported that a similar operant procedure was clinically useful in training finer, more coordinated control of normal muscles. In this instance, movements produced by normal shoulder muscles were used to control a motorized splint. The splint provided a functional grasp in the paralyzed hands of quadriplegic patients. The addition of operant procedures to the usual training program led to more skilled use of the splint. This study is of particular interest because the treatment goal was not increased strength but increased skill.

Operant Procedures in Training of Dysfunctional Muscles

The preceding two studies illustrate the effectiveness of operant procedures to improve strength and control in normal muscles. There are also a number of studies exploring the possibility of using similar procedures to alter impaired motor responses.

There are two interesting reports describing the use of shock avoidance and escape procedures to increase the use of paretic arm muscles in adult hemiplegic subjects. In one of these studies the goal was to reinforce elbow flexion in the severely paretic arms of three hemiplegic subjects who had suffered cerebral vascular accidents (strokes) at least 6 months previously (Ince, 1969). None of the three subjects could produce the required responses during 50 trials in a pretraining test session. Training was initiated by requiring 5 degrees of elbow flexion to avoid or escape a mild shock administered to the normal, nonplegic arm. Two of the subjects showed no improvement. The third subject showed improvements by the second training session and attained 40–50 degrees of elbow flexion by the end of 25 training sessions. This subject also showed small improvements in muscle test scores and was able to use the paretic arm in an assisting capacity in daily activities.

In a second study using a similar shock avoidance procedure, a group of 20 elderly hemiplegic subjects were required to produce small horizontal and vertical movements using their paretic arms (Halberstam, Zaretsky, Brucker, & Guttman, 1971). In this study, subjects were selected who could produce some small movements to begin with. All subjects showed marked improvement in speed and distance of response as a result of training.

Although the use of even mild aversive shock has obvious drawbacks, particularly with elderly, brain-damaged patients, these two studies raise the question of whether operant procedures using positive reinforcement might also be effective in retraining muscle responses in such patients. The systematic use of reinforcement to gradually shape responses might have been far more important than the aversive quality of the reinforcing stimulus.

In contrast to studies in which operant procedures are used to increase responses in paretic muscles, Sachs and Mayhall (1971) have reported use of an aversive conditioning procedure to reduce frequency of abnormal, involuntary movements in a cerebral palsied adult. The

therapist observed the unwanted responses and delivered mild electric shock immediately following abnormal movements. The incidence of such movements totaled 45–82 during four pretraining baseline sessions. With the onset of training, there was an immediate reduction in abnormal movements to a total of 3–16 during the last four of eight training sessions. Although there was no attempt to determine whether there was a therapeutic effect, in a later study it was noted that the incidence of abnormal movements was still low on follow-up 4 months after the original training (Sachs & Mayhall, 1972).

A similar case study by Barrett (1962) is noteworthy in that well-documented reductions in voluntary movements were obtained in a dystonic patient using a much milder aversive stimulus, the interruption of pleasurable music. These learned reductions were also retained over several months. This study is procedurally interesting in that the detection of the voluntary movements and delivery of the reinforcing stimulus were automated.

Conclusion

Although the studies that have been published are not numerous, they do indicate that the principles of operant conditioning can be effectively applied in therapeutic exercise programs. Operant procedures have been reported effective in increasing strength and skill in normal muscles. They have also been reported effective in increasing voluntary responses and decreasing abnormal movements in dysfunctional muscles. Although the tendency has been to use strong and aversive contingencies to alter abnormal responses, this does not appear to be necessary. There is also some initial, though primarily anecdotal, evidence that such learning is maintained over time and that the learned changes can be incorporated into daily, functional activities. This work is certainly sufficiently promising to warrant continued and expanded exploration.

MOTOR SKILLS LEARNING

There is a considerable body of literature on the learning of skilled motor responses that require coordinated control of striate muscles in normal human subjects. It would seem natural to seek to apply both the theory and the methodology of motor skills learning in neuromuscular control. It is only recently, however, that the possibility of clinical application has begun to be explored.

Motor Learning Theory

Normally, motor learning is considered to proceed through trial and error. Response-contingent internal and external sensory events provide feedback concerning the success or failure of one's efforts, and the motor

response is adjusted accordingly. This informative feedback can be provided by the sensory feedback normally available through vision, touch, and proprioception. Feedback can also be provided by the experimenter or therapist and is variously termed information feedback, knowledge of results, and augmented sensory feedback (Bilodeau & Bilodeau, 1969). The outcome of practice with informative feedback is a gradual refinement of voluntary motor output and an increased level of skill (coordinated control).

Practice with informative feedback is conceptualized as leading to improved motor control through a process of sensorimotor integration due to sensory calibration and formation of motor programs. During the initial stages of skill acquisition, the learner tends to monitor his or her motor responses exteroceptively. As skilled performance is acquired, the monitoring function is gradually transferred to proprioception. The readily discriminable exteroceptive cues provided by vision and touch are thought to identify and calibrate the less apparent proprioceptive signals, which then assume a more dominant role in motor control. With continued practice, which may have to be considerable, control can shift to central motor programs that are capable of directing the rapid and complex patterns of muscle responses underlying much of skilled motor behavior (Kottke, Halpern, Easton, Ozel, & Burrill, 1978).

Clinical Application of Motor Learning Principles

Clinical applications derived from motor skills learning have almost exclusively dealt with cerebral palsy. Sensory and perceptual deficits are often found in cerebral palsied individuals and are thought to contribute to the motor deficits that are seen (Hohman, Baker, & Reed, 1958; Twitchell, 1959). This combination of motor incoordination with sensory and perceptual abnormalities suggests that motor learning procedures designed to improve sensorimotor integration might be of benefit.

Connolly (1968, 1970) has reported a training procedure that incorporates systematic practice with informative feedback to improve the performance of the cerebral palsied child whose motor responses are uncoordinated, inaccurate, and slow. The training apparatus consisted of a clown's face mounted in a frame. The child's task was to push a large button on a tabletop to turn on a red light in the clown's nose and then to hit the clown on the nose to turn it off again. An incorrect response was signaled by a tone. Initially, an unlimited time was allowed for the task, and the nose target was quite large (16 square inches). As training progressed, the target size was reduced, and time requirements were instituted. The nose light and error tone were considered knowledge of results that provided feedback during practice. The clown face and a number of scheduled operant reinforcers, candy and praise administered by the clown, were used to maintain interest in the task. To illustrate the results of the training procedure, one child was described who took 2.7 seconds to hit the largest target at the start of training. This child was able to hit a medium-sized target in .7 seconds with a few weeks of training. Connolly

concluded, based on initial experiments with the apparatus, that it was possible to improve simple motor skills in cerebral palsied children. He also mentioned subsequent work on generalization and retention of learned improvements. Following training, children also showed improvement on a range of motor tasks, and this improvement was maintained after 6 weeks without practice.

Sachs and his colleagues systematically examined the effects of information feedback provided to a functionally deaf cerebral palsied child learning a manual dexterity task and a cerebral palsied adult working on a rotor pursuit task (Sachs & Mayhall 1972; Sachs, Martin, & Fitch, 1972). In both cases there were positive effects attributable to informative feedback. Performance on both motor tasks was measurably better during trials on which feedback was provided than on no-feedback trials. The authors concluded that immediate, contingent feedback can improve motor functioning above that expected with practice alone.

Conclusion

Considering the long history of motor skills learning, it is surprising that the potential for clinical application in physical rehabilitation has not been explored more extensively. At present, motor skills theory has primarily been influential in suggesting a basis for autonomic learning where concepts such as calibration and augmented sensory feedback have been very fruitful (Brener, 1974). The studies reported in this section, however, indicate that procedures for optimizing learned control of neuromuscular responses in normal individuals have relevance for learning following nervous system insult as well. It is perhaps time for a thorough consideration of the full range of motor learning principles and procedures in therapeutic exercise.

PROGRESSIVE MUSCLE RELAXATION

In physical rehabilitation, as in many other clinical areas, progressive muscle relaxation procedures are being used psychotherapeutically to produce alterations in emotional affect and reductions in physiological arousal. In addition, however, these procedures are used as therapeutic exercise to teach direct, voluntary control of the muscular symptoms of neurological and musculoskeletal disorders such as spasticity, involuntary movements, and muscle spasm.

Psychotherapeutic Applications

Several studies have recently appeared that report innovative applications of progressive muscle relaxation procedures for management of anxiety, psychological stress, and pain in patients with primary neurolog-

ical disorders. These studies represent an important new development in physical rehabilitation.

Marshall and Watts (1976) have explored the use of progressive muscle relaxation in 16 adult patients with aphasia due to strokes that had occurred at least 4 months prior to the study. A test battery was used to measure verbal performance for each subject immediately following a single progressive muscle relaxation training period and also following a control period in which the individual spent an equal period of time sitting quietly. Mean performance was significantly better (p < .01) following the progressive muscle relaxation period, indicating that the verbal communication of aphasic persons was positively influenced by relaxation training. The authors suggested that relaxation reduced anxiety and thereby improved communciation performance.

Garrison (1978) described a stress management training program that was developed to teach handicapped patients the use of relaxation as a coping skill and presented illustrative case reports for four patients—two hemiplegic, one spinal cord injured, and one with Guillain-Barré. All four patients completed the program and found it to be beneficial. They reported frequent use of their new relaxation skills in everyday, stressful situations. The two hemiplegic patients also noted some ability to abort incipient spasms in their spastic limbs. On follow-up 18 months after training, the patients were still using their relaxation skills.

Grzesiak (1977) reported the effective use of a similar procedure for management of chronic pain in four spinal cord–injured patients. Three of the four patients reported subjective relief of pain as a result of relaxation training. These subjective reports were corroborated by improvements in pain-related behavior. Complaints of pain decreased, and attendance at exercise sessions increased. On follow-up 1–2 years after training, the improvements were being maintained.

Therapeutic Exercise Applications

There is a long but inconclusive history of clinical applications of progressive muscle relaxation training to teach inhibition of spasticity and athetoid movements in cerebral palsy.

Jacobson (1938) offered a brief, anecdotal account of the treatment of a 12-year-old child with congenital spastic diplegia. The child was trained in progressive muscle relaxation three times a week over a period of 9 months. Training also included daily practice sessions in which the emphasis was on combining relaxation with active use of the limbs. By the end of training, there was a noted decrease in spastic resistance to passive movement at the joints and improvements in gait. Although previously the child had been able to walk with a shuffling gait, she was now able to run for the first time and also to roller-skate.

At present, mention of progressive muscle relaxation as a method for reducing spasticity and athetoid movements can be found in most texts

on cerebral palsy. In reading these accounts, however, one finds considerable disagreement concerning their clinical efficacy. Favorable accounts (Keats, 1970; Levitt, 1962) indicate that progressive muscle relaxation can be effective in reducing athetoid movements but is less successful in managing spasticity. Treatment includes training in basic relaxation skills and practice of relaxation during attempts to perform active, voluntary movements. Treatment requires a high level of cooperation and a considerable period of time (at least a year by one account), but with such practice "a large degree of control of the disrupting athetoid movements can be obtained" (Levitt, 1962, p. 73).

An opposing view is presented by Denhoff and Robinault (1960), who reviewed the use of relaxation procedures in cerebral palsy. These authors concluded that although relaxation has long been associated with treatment of athetosis, in their opinion there is little lasting effect. Muscle relaxation does not exceed the motor quiescence that can be obtained simply by lying still in a quiet room, and the primary benefit is psychological. The child might experience a pleasurable feeling of ease, but there is no change in neuromuscular control.

Reading these accounts, one can only conclude that progressive muscle relaxation procedures have been widely used in treatment of cerebral palsy but have always been controversial. Currently, relaxation training is not routinely included in cerebral palsy treatment programs. It is also very apparent that a basic problem has been the lack of information on which to base an objective evaluation of clinical efficacy. References offered in support of current opinions, pro and con, lead to more opinions rather than clinical or experimental documentation.

Application to Muscular Symptoms Related to Stress

The greatest use of progressive muscle relaxation procedures in physical rehabilitation has been in treatment of musculoskeletal disorders that are commonly considered to be at least partially stress related. Since both stress and specific muscular symptoms are involved, both psychotherapeutic and therapeutic exercise treatment rationales have been offered for these applications.

According to one rationale, progressive muscle relaxation is primarily a stress management procedure, and reductions in muscular symptoms are due to psychotherapeutic effects. Rinehart (1967) has discussed his application of progressive muscle relaxation in treatment of arthritic and rheumatic disorders from this perspective. He obtained clinically relevant improvements in patients with joint and muscle pains that he considered to be stress related and described the therapeutic process as one in which the muscle relaxation reduces underlying psychological stress to alter the disease process and secondarily reduces the musculoskeletal symptoms.

According to the alternative rationale, progressive muscle relaxation

is a therapeutic exercise procedure, and reductions in muscular symptoms are due directly to learned improvements in muscular control. From this perspective, stress is acknowledged as a causative factor, but treatment is directed toward teaching the patient to control not the underlying stress but the muscular side effects of stress. Kottke (1971) has suggested that the neuromuscular system responds to anxiety or stress with prolonged muscular contractions that cause discomfort in muscles and joints, and neck ache and headache. These symptoms are problems in themselves and also aggravate the underlying stress conditions. Progressive muscle relaxation teaches the patient to be aware of the muscular contractions and inhibit them. Anxiety can be reduced secondarily as the problematic muscular symptoms are brought under voluntary control.

Conclusion

The clinical application of progressive muscle relaxation in physical rehabilitation promises to be a very fruitful area for clinical and experimental exploration. Application of procedures for pain and stress management in patients with major neurological disorders is also a promising new development warranting continued attention.

Application of progressive muscle relaxation to improve control of spasticity and involuntary movements should be seriously reexamined, particularly since the problems that discouraged use in the past can be dealt with today. New procedures have shortened training time, EMG monitoring devices are available for documentation of muscle changes, and advances in experimental methodology, such as the use of single-subject designs, make clinical research far more feasible.

Systematic investigation of progressive muscle relaxation in the treatment of what are presumed to be stress-related musculoskeletal disorders is also urgently needed. The relationships among stress, muscular contractions, and muscle and joint pain are very interesting and still speculative (Nouwen & Solinger, 1979; Phillips, 1978). Documentation of muscle hyperactivity, muscle change with treatment, and improvement in clincial symptoms are all needed to advance our understanding of these disorders and progressive muscle relaxation as a treatment for them.

BIOFEEDBACK

The behavioral approach to muscle training that has seen the greatest clinical application is biofeedback. Electromyographic (EMG) feedback procedures have been reported effective in obtaining voluntary relaxation of unwanted muscle contractions and in improving strength, range of motion, and control of paretic muscles (Inglis et al., 1976). Force and position monitors have been reported effective in improving head posi-

tion, foot placement, weight bearing, and joint range of motion (Fernando & Basmajian, 1978). Such monitors provide information concerning body posture and movement rather than muscle contractions.

These biofeedback devices provide the patient with response-contingent information that can be used to guide trial-and-error learning. A distinction is often made between biofeedback signals as information feedback and as operant reinforcement. Such a distinction is difficult to support and is not made in the present chapter. Reinforcement necessarily provides information that a response has been made, whereas information that a valued response has occurred can be considered secondarily reinforcing (Black, Cott, & Pavloski, 1977; Harrison, 1977).

In muscle training applications, biofeedback procedures are theoretically useful in the following situations: (1) when working with small, imperceptible muscle contractions or movements; (2) when small changes in strong muscle contractions or obvious movements are signaled to enable learning to proceed through a series of small, achievable steps; (3) when sensory loss or imperception is present and responses that would normally be apparent go undetected; and (4) when new neuromuscular relationships must be learned following nerve anastomosis (Brown, Nahai, Wolf, & Basmajian, 1978), tendon transfer, and possibly brain damage (Yu, 1976).

The biofeedback procedures in use today for muscle training can be viewed as the logical extension of principles and procedures from operant conditioning and motor skills learning to covert neuromuscular events, that is, muscle contractions, small-scale movements, and postural adjustments (Connolly, 1968; Harrison, 1977; Hefferline, 1958). Contributions to today's procedures have also been made by physical rehabilitation clinicians who have long observed that letting patients see and hear their muscle responses, via EMG, seems to facilitate the therapeutic exercise process (Marinacci, 1968; Mims, 1956). An additional impetus has been provided by the work of neurophysiologists who have described feedback mechanisms in neuromuscular control systems (Evarts, 1971), observed that disruption of sensory feedback disrupts motor control (Taub & Berman, 1968), and demonstrated that procedures for augmenting sensory feedback can extend voluntary control to the level of the single motor unit (Basmajian, 1963; Harrison & Connolly, 1971). This body of theory, clinical observation, and experimental work provides a strong rationale for clinical application of biofeedback procedures in the treatment of neuromuscular dysfunction.

Despite the strong rationale underlying clinical application of biofeedback procedures in muscle training, experimental evidence of clinical efficacy is at present marginal. Much of the published work consists of clinical trials and uncontrolled case reports. Only quite recently have studies begun to appear that attend to the experimental controls needed to rule out alternative explanations for the clinical changes obtained. Although it is well established that treatment that includes

biofeedback can result in clinically relevant change, there is often little evidence that the changes can be attributed, unequivocally, to the specific effects of the biofeedback display.

Clinical Efficacy: Clinically Relevant Change

One important step in establishing the clinical efficacy of biofeedback procedures in muscle training is to determine whether or not treatment that includes biofeedback can produce clinically relevant changes. There should be improvements that are large enough to be of practical benefit to the patient; these improvements should be retained under nonfeedback conditions and incorporated into daily activities; and they should be well maintained over time. The clinical trials and case reports that comprise much of the literature in this area provide valuable information concerning this aspect of clinical efficacy.

Neurological Disorders

At present there is good evidence of clinically relevant changes with biofeedback training, based on extensive clinical trials, for several neurological conditions, including adult hemiplegia, spasmodic torticollis, and cerebral palsy.

Brudny *et al.*, (1976) have reported treatment outcomes for 39 adult hemiplegic patients, all of whom had strokes or traumas at least 9 months prior to entering the biofeedback program. Treatment included EMG feedback to upper extremity muscles over a period of several months. Twenty patients (50%) made gains substantial enough to be of benefit in performing daily activities, and these gains were maintained at follow-ups of 3–36 months. Similar results are reported by Wannstedt and Herman (1978), who used a limb load monitor to train symmetrical standing in hemiplegic subjects. Of their 30 patients, 16 (53%) achieved symmetrical standing that was maintained at a 1-month follow-up. Their patients received an average of 11 daily biofeedback training sessions.

Brudny and his co-workers have reported on 55 patients who were trained with EMG feedback to relax hyperactive neck muscles. Of their patients, 58% improved with biofeedback training, and 40% maintained these gains at a 3-month follow-up (Korein, Brudny, Grynbaum, Sachs-Frankel, Weisinger, & Levidow, 1976). Cleeland (1979) has reported on 52 torticollis patients and found 50% with well-maintained gains at follow-ups that averaged 30 months after EMG feedback training.

There are also well-documented gains with biofeedback in the treatment of cerebral palsy (CP). Harris *et al.* (1974) trained 18 athetoid CP children with head and limb position monitors over a period of months. All showed improved control while working with the feedback devices, and at least five (23%) were anecdotally reported as making gains that were useful to them during daily activities outside the training situation.

More precise information concerning retention is offered by Wooldridge and Russell (1976). Of 12 CP children they trained with a head position monitor, all showed some improvements while wearing the feedback device; 6 (50%) made gains during the course of training, and 3 (25%) made gains that were still evident in their daily acitivities at follow-up 2–5 months after training. Similar figures have been cited in preliminary reports on 40 CP children treated with a number of different biofeedback devices by Silverstein and co-workers (Block & Silverstein, 1978; Fernando & Basmajian, 1978). These studies indicate that, although many CP children respond to biofeedback training, long-term retention of learned gains is a problem. This might often be because children are less likely than adults to practice incorporation of learned skills into daily activities. If so, training procedures specifically designed to promote generalization and retention, particularly in children, might be important (Bird, Cataldo, Parker, Baker, & Francis, 1979; Bird, Parker, & Cataldo, 1979).

Clinically relevant gains with EMG feedback have been reported for several other neurological disorders including Bell's palsy (Brown *et al.*, 1978), parkinsonism (Hand, Burns, & Ireland, 1979; Netsell & Cleeland, 1973), tardive dyskinesia (Albanese & Gaarder, 1977; Sherman, 1979), and incomplete paraplegia (Seymour & Bassler, 1977; Dunn, Davis & Webster, 1978; Dunn & Eads, 1979). These applications are promising, but only a few case reports are available at present.

Musculoskeletal Disorders

Most of the reported clinical applications of biofeedback in treatment of musculoskeletal disorders have centered around the use of EMG feedback in patients with chronic pain that is thought to be related to muscle spasm or chronic muscle hyperactivity. As with progressive muscle relaxation procedures, EMG feedback has been applied in two somewhat different ways.

It has been used for direct (targeted) training of relaxation in individual muscles or muscle groups that are thought to be closely related to the pain symptoms. Carlsson and Gale (1977) have reported using EMG feedback to train relaxation of the masseter muscle in patients with temporomandibular joint pain. Of their 11 patients, 8 (72%) were symptom free at follow-up 4–15 weeks after training. Peck and Kraft (1977) reported that using EMG feedback for relaxation of facial (frontalis) and posterior cervical (trapezius) muscles was effective in 12 of 18 (63%) of their patients with tension headache and neck pain. Their study included a 3-month follow-up.

Direct training has been used in treatment of patients with chronic low back pain with mixed results. Peck and Kraft (1977) used EMG feedback to train relaxation of low back paraspinous muscles in patients with chronic low back pain. Only one of eight showed even mild improve-

ment. They concluded that such direct training of low back muscles was ineffective. Although muscle "tension" was presumed to be a causative factor in many of these patients, their symptoms tended to be diffuse and bore no clear relationship to hyperactivity in the lower back muscles. Belan and Cohen (1979) have documented improvements that were well maintained at follow-up 3 months following EMG feedback training in a single patient. Their patient had upper back pain that was clearly related to known traumatic injury to the muscles being trained.

Electromyographic feedback has also been used for obtaining generalized muscle relaxation as part of stress and pain management programs. Achterberg *et al.* (1981) have reported using EMG and temperature feedback in combination with progressive muscle relaxation and temperature training as part of a comprehensive rehabilitation program for rheumatoid arthritis patients. They found reductions in pain, improvements in activities of daily living, and changes in patient attitude toward the disease. General relaxation procedures incorporating biofeedback are in common use as part of comprehensive programs for rehabilitation of chronic low back pain patients (Gottlieb, Strite, Koller, Madorsky, Hockersmith, Kleeman, & Wagner, 1977).

Biofeedback procedures are also being used in treatment of musculoskeletal problems that do not involve chronic pain. There are initial reports of EMG and joint position feedback assisting postsurgical rehabilitation of the hand (Brown & Nahai, 1979) and the knee (Sprenger *et al.*, 1979).

Clinical Efficacy: Specific Effects

Although it is important to establish that patients treated with biofeedback make clinically relevant gains, it is also important to demonstrate that these gains are attributable at least in part to the specific effects of the biofeedback display. Few of the clinical reports presented in the preceding section have included controls that would rule out alternative explanations for the clinical changes obtained.

There are several nonspecific factors that are likely to improve treatment outcome when biofeedback is used in treatment of physical rehabilitation patients. Biofeedback is often used in conjunction with other treatment procedures that are effective by themselves, making it difficult to evaluate relative contributions to outcome. Biofeedback procedures often focus on individual muscles or movements to a far greater extent than is usual with other therapeutic exercise procedures, and a similar concentration of time and effort without a biofeedback display could be just as effective. The enthusiasm of both therapist and patient for a new procedure is likely to produce a high level of interest and cooperation that can contribute substantially to treatment outcome.

A specific effect, on the other hand, presumes that the added information provided by the response-contingent biofeedback display enables

the patient to attain a degree of strength, control, or relaxation that would not be possible without that added information, attain it more rapidly, or retain it better. Until recently, it has been assumed that if a patient had a history of previous treatment and a period of symptom stability prior to retreatment with biofeedback, then improvements could be attributed unequivocably to the specific effects of the biofeedback display (Blanchard & Young, 1974; Brudny et al., 1976). At present, there is a welcome realization that this assumption is not warranted and that a more critical and rigorous investigation of biofeedback effects is essential if clinical efficacy is to be established and its basis understood (Keefe & Surwit, 1978; Middaugh & Miller, 1979, 1980).

Current studies are taking four somewhat different approaches to the investigation of specific biofeedback effects.

Clinical Trials Revisited

Valuable information can be gained from clinical trials and case reports that include detailed descriptions of biofeedback procedures, information on patient characteristics, objective documentation of gains, and statistical analyses of results. Such studies are valuable in developing optimal biofeedback treatment procedures for subsequent formal testing. In addition, the information from single studies and from several studies taken together can implicate important factors underlying biofeedback effects, specific and nonspecific. Several excellent studies of this type have recently appeared.

Finley and his co-workers have reported two studies in which EMG feedback relaxation training, using a frontalis recording site, was used in the treatment of 10 cerebral palsy patients. Improvements on multiple-objective measures of gross and fine motor control and speech were tested statistically for each individual patient. Significant gains were found both for athetoid adults and for spastic children. Greater improvements were noted for individuals with less severe neuromuscular problems, and the changes on measures of motor control were consistent with the changes in EMG activity obtained during training (Finley, Niman, Standley, & Ender, 1976; Finley, Niman, Standley, & Wansley, 1977).

Wolf, Baker, & Kelly (1979) have reported on a number of patient characteristics as determinants of response to EMG feedback for neuromuscular reeducation in 52 adult stroke patients. Age, time since injury, and laterality of brain damage were not strong predictors, but proprioceptive loss adversely affected treatment outcome.

Nouwen and Solinger (1979) used EMG feedback to train relaxation of low back muscles in 18 patients with chronic low back pain. They found statistically significant reductions in both EMG levels and pain ratings on completion of training. At a 3-month follow-up, EMG levels had returned to pretreatment levels for all but one patient, but pain ratings remained low. These findings suggested that pain decrements

were independent of EMG level and that the feeling of self-control was an important factor in the maintenance of therapeutic benefits.

Controlled Comparison with Alternative Treatment Procedures

Two studies have compared EMG feedback procedures with different therapeutic exercise procedures in the treatment of adult hemiplegic patients.

Basmajian *et al.* (1975) compared one group of 10 patients who received 40 minutes of therapeutic exercise with a second group of 10 patients who received 20 mintues of therapeutic exercise plus 20 minutes of EMG feedback training of the anterior tibialis muscle. For both groups, the emphasis was on ankle dorsiflexion to correct foot drop and improve gait. The biofeedback group showed increases in muscle strength and ankle range of motion twice those of the nonfeedback group. Interestingly, over half the patients in the nonfeedback group made measureable gains in strength, range of motion, and gait that were maintained at follow-up.

Mroczek, Halpern, and McHugh (1978) compared an EMG feedback procedure with an alternative therapeutic exercise procedure for improving strength and range of motion in upper extremity muscles, primarily the wrist extensors. A single group of nine patients was employed, and each patient received both treatments in a crossover design that permitted a degree of comparison between the two treatment procedures. Only the EMG feedback procedure led to improvements on two EMG measures related to strength of contraction of the target muscles. Both procedures produced gains in range of motion.

Both of these studies demonstrate that there is often potential for functional gains in long-term stroke patients that is not being developed and also that such gains are not limited to patients using biofeedback. The control procedures also produced gains. These studies also point out that procedural variables are important in determining the nature and extent of gains that are made. The biofeedback procedures had more impact on measures of strength than on measures of range of motion. The basic limitation of such studies is that they compare two treatment packages differing in numerous ways, making it difficult to assess the specific contribution of EMG feedback. This raises the question, to what extent there would be differences in treatment outcome if two treatment procedures were identical except for the presence or absence of EMG feedback?

Controlled Comparison with Identical, Nonfeedback Treatment

The most direct approach to the investigation of specific effects is to compare the outcome of muscle training procedures that are identical except for the presence or absence of biofeedback. A few studies have taken this approach with some interesting results.

Middaugh and Miller (1979, 1980) have reported a series of closely controlled short-term studies that permitted the detailed analysis of EMG feedback effects during muscle training. In one study, 12 patients, six with hemiplegia and six with peripheral nervous system damage, were asked to produce a series of voluntary contractions of a paretic muscle. For each patient, EMG feedback was provided on half the trials, alternating with nonfeedback trials for two sessions. The guiding assumption was that if EMG feedback does indeed have a positive effect on the learning process, then voluntary muscle contractions attempted with EMG feedback must differ in an observable and measurable way when compared with an identical attempt by the same patient without added feedback. The results indicated a substantial and specific EMG feedback effect. EMG activity was significantly greater on EMG feedback trials. This effect was not closely linked to type of injury, duration of injury, or age.

These findings were replicated in a subsequent study of normal individuals working with an unfamiliar and poorly controlled muscle, the abductor hallucis (Middaugh, Miller, Foster, & Ferdon, 1980). This study indicated that pathological disruption of normal sensory feedback channels need not underly response to EMG feedback. The authors have suggested that EMG feedback improves learning by providing useful information regarding the relatively small, marginally discriminable muscle contractions that were the focus of their studies.

Kleinman and his co-workers have reported two studies of EMG feedback in adult hemiplegic patients. Both studies included two conditions, an initial baseline condition in which the patients practiced the experimental task without EMG feedback and an EMG feedback training condition of 4–6 weeks. Each patient began with the nonfeedback baseline condition, but half began EMG feedback training prior to the other half. This design permitted both within- and between-group comparison of nonfeedback practice with EMG feedback training. In the first study, EMG feedback training led to improved relaxation of spastic elbow flexors (Kleinman, Keister, Riggin, Goldman, & Korol, 1976). In the second study, EMG feedback training improved ability to voluntarily contract paretic ankle flexor muscles (Santee, Riggin, Kleinman, & Keister, 1976). The comparisons between EMG feedback training and nonfeedback practice in these two studies must be considered tentative. There were some variations in measurement methods under the two conditions. In addition, it was not possible to evaluate whether there were differences in instructions or amount of daily practice. Nevertheless, these are important studies that should stimulate further, more definitive work.

Two studies have compared an EMG feedback procedure with identical, nonfeedback training to reduce muscle hyperactivity in patients with neck and back pain. In one study, Jacobs and Felton (1969) found that patients with diagnosed injuries of the upper trapezius were better able to relax this muscle during trials with EMG feedback than

during trials without EMG feedback in a single experimental session. This excellent early study has unfortunately not been followed by studies to compare the relative effects of more prolonged training on muscle relaxation or neck pain.

In the second study, Kravitz, Moore, Glaros, and Stauffer (1978) trained 14 patients to differentially relax low back paraspinous muscles while progressively tensing and relaxing other muscle groups throughout the body. Half the patients were trained with EMG feedback from the low back muscles, and the other half were trained without EMG feedback. Both training procedures led to improved relaxation of low back muscles with no differences between groups. By the end of the 4-week period of training, 69% of the patients reported experiencing back pain less often and 90% felt the treatment had been helpful.

Single-Subject Designs

A very workable but often overlooked approach to investigation of specific effects is through formal single-subject designs (Barlow, Blanchard, Hayes, & Epstein, 1977). In essence, these designs objectively assess changes in the individual patient that coincide with changes in training conditions. This approach can provide considerable information with relatively few subjects.

An ingenious study has been reported by Skrotzky, Gallenstein, and Osternig (1978). Four cerebral palsy patients with spastic paresis of both legs were trained, twice daily for 10 days, in the use of two muscles that are important in ankle control, the anterior tibialis and the gastrocnemius. Training consisted of attempts to contract and rapidly relax each muscle separately and to differentially relax one while contracting the other. For each patient, one leg was trained the entire 10 days with EMG feedback. The other leg, used as a control, was trained on the same exercises without EMG feedback for the first 5 days, and with EMG feedback for the second 5 days. All four patients showed improvements, but the improvements only occurred with EMG feedback training. In addition, improvements were better maintained for the leg that had twice the EMG feedback training at follow-up 4–9 weeks after training.

Cataldo, Bird, and Cunningham (1978) used EMG feedback procedures to train improved control of involuntary movements in three choreoathetoid cerebral palsy patients. They interspersed baseline periods and nonfeedback training trials throughout the course of training to evaluate the contribution of EMG feedback to the training process. They concluded that EMG feedback makes a specific and positive contribution to the muscle training process.

The studies presented above are important ones. They illustrate that there is no single correct way to answer questions concerning clinical efficacy. Rigorous clinical trails, controlled comparisons with alternative therapeutic exercise programs, controlled comparisons with identical nonfeedback treatments, and single-subject designs all make valid and

important contributions to our knowledge of specific biofeedback effects. These studies also illustrate the high quality of investigation that is possible with well-described procedures, attention to subject characteristics, quantitative measures, and statistical analyses where appropriate. In addition, many of these studies make the important point that inclusion of formal experimental controls is possible without sacrificing clinical relevance or involving large numbers of patients. The study that is perhaps the best single study to date of biofeedback in neuromuscular reeducation is that by Skrotzky et al. (1978). This study includes only four patients, but it provides a wealth of information.

Conclusion

The introduction of biofeedback procedures into therapeutic exercise programs is an exciting development that holds considerable promise for improved treatment of patients with neurological and musculoskeletal disorders. However, it is important to realize that well-controlled experimental exploration of biofeedback effects is just beginning, and few definitive answers to questions of clinical efficacy are now available.

At present there is good evidence, based on relatively extensive clinical trails, that biofeedback training programs can produce clinically relevant gains when used in the treatment of several neurological disorders, that is, stroke, cerebral palsy, and spasmodic torticollis. There is preliminary evidence, based on recent experimental studies, that specific rather than nonspecific biofeedback effects are responsible for some part of these improvements in treatment outcome. As yet, little is known about the nature or extent of the biofeedback contribution. There is some initial evidence that biofeedback can accelerate the normal motor learning process (Shiavi, Champion, Freeman, & Bugel 1979). It is not known whether there are also instances in which biofeedback is required for learning. Although there is a common presumption that biofeedback is essential for learned control of spasticity and involuntary movements, for example, there are suggestions in the literature that some degree of voluntary control can be acquired without biofeedback (Anderson & Kottke, 1978; MacPherson, 1967; Middaugh & Miller, 1979). There has been no systematic investigation of this very interesting and relevant question, nor of many other questions that can be raised concerning clinical efficacy.

Biofeedback procedures have been widely applied in treatment of chronic pain thought to be related to muscle hyperactivity. In these musculoskeletal applications, the use of EMG feedback to directly train relaxation of the suspect muscles has led to clinically relevant improvements in many patients with muscle contraction headaches, temperomandibular joint pain, and neck pain. Such direct training of low back muscles in patients with low back pain, however, has been far less successful. One can conclude that the use of EMG feedback for direct muscle training is most effective when there are well-delineated pain symptoms and objec-

tive evidence of muscle hyperactivity in the appropriate target muscles. In many instances of chronic low back pain, neither of these criteria are met. EMG feedback training may well prove to be a valuable adjunct to treatment of low back pain in selected patients, but effective training is likely to go well beyond simple relaxation training of low back muscles to include retraining in the correct use of these complex postural muscles during daily activities (Jones & Wolf, 1980; Wolf, Basmajian, Russe, & Kutner, 1979).

Biofeedback has not only introduced promising new approaches to muscle training but has also been responsible for several other recent developments in physical rehabilitation that may well prove to be equally important.

Biofeedback procedures have introduced physiological monitoring into therapeutic exercise programs on a routine basis. Therapists who become familiar with EMG monitoring through biofeedback are finding that EMG monitors are a valuable source of information for the therapist and an important new tool for patient evaluation, treatment selection, and progress testing. By monitoring the muscles they work with, therapists can better tailor all treatment procedures to the individual patient, and such individualized treatment is likely to be better treatment (Forward, 1972; Holt, 1966; Middaugh, 1976).

The numerous clinical and experimental studies that have been published in an effort to document clinical changes and validate biofeedback procedures have set an important precedent for clinical research in therapeutic exercise. In addition, many of the specific experimental methods that have been developed in biofeedback studies are well-suited for testing of other therapeutic exercise procedures as well (Middaugh, 1978). This experimental orientation and know-how is having a very constructive impact on a field that has little experimental tradition.

Biofeedback has encouraged constructive interaction between behavioral psychology and physical rehabilitation. The basic psychological concepts of voluntary control and self-regulation are a welcome, though provocative, addition to current therapeutic exercise programs, which are often overly reliant on eliciting reflexes as treatment and which often do not take full advantage of the patient as an active learner and participant in the treatment process. In turn, psychologists are moving away from general, and often hypothetical, explanatory concepts such as "muscle tension" and are beginning to tailor treatment procedures to better fit the realities of their patients' neuromuscular characteristics (Kravitz *et al.*, 1978; Peck & Kraft, 1977). Clinicians in both fields are often working together and pooling their knowledge for the benefit of their patients.

CONCLUSION

The behavioral approaches to muscle training presented in this chapter all apply current knowledge of human learning to problems of relearn-

ing following neurological or musculoskeletal injury or disease. The overwhelming conclusion is that there is much to be gained from the systematic application of behavioral principles and procedures, and such application is long overdue. It should be emphasized, however, that behavioral approaches in no way replace or negate current therapeutic exercise programs but, rather, that they provide new clinical tools to enhance and augment current treatment procedures.

Biofeedback procedures hold particular promise for improved treatment of the physical rehabilitation patient, but we need to know far more about the nature and extent of biofeedback effects and their interaction with important subject and procedural variables. At the same time, it is important to determine the extent of voluntary control of neuromuscular symptoms without biofeedback. It has been observed that a degree of voluntary control of spasticity and involuntary movements can be learned with intensive practice (Anderson & Kottke, 1978) and with progressive muscle relaxation (Garrison, 1978; MacPherson, 1967), but there has been no objective exploration of such observations.

There is a critical need for more thoughtful and objective consideration of the interaction of pain, stress, and neuromuscular symptoms. It has long been known, for example, that pain and emotional stress can aggravate spasticity and involuntary movements. Much less is known, though much is assumed, about stress as a contributory or even causative factor in many musculoskeletal disorders. It would seem relevant, then, to evaluate general relaxation and other stress management procedures as part of rehabilitation programs for hemiplegia (Garrison, 1978), spinal cord injury (Dunn & Eads, 1979), and rheumatoid arthritis (Achterberg et al., 1981). It would seem equally relevant to include direct muscle training as part of general relaxation and stress management programs when there are identifiable muscle symptoms (Kravits et al., 1978). This will require recording for objective evaluation, a welcome development in itself. Such combined treatment approaches would seem to have much to offer.

The introduction of behavioral principles and procedures into therapeutic exercise programs represents an important development that has produced promising new treatment procedures, stimulated research, and increased opportunities for professional exchange between behavioral psychologists and rehabilitation clinicians.

REFERENCES

Achterberg, J., McGraw, P., & Lawlis, G. F. Rheumatoid arthritis: A study of relaxation and temperature biofeedback training as an adjunctive therapy. *Biofeedback and Self-Regulation*, 1981, *6*, 207–223.

Albanese, H., & Gaarder, K. Biofeedback treatment of tardive dyskinesia: Two case reports. *American Journal of Psychiatry*, 1977, *134*, 1149–1150.

Anderson, T. P., & Kottke, F. J. Stroke rehabilitation: A reconsideration of some common attitudes. *Archives of Physical Medicine and Rehabilitation*, 1978, *59*, 179–181.

Barlow, D. H., Blanchard, E. B., Hayes, S. C., & Epstein, L. H. Single-case designs and clinical biofeedback experimentation. *Biofeedback and Self-Regulation*, 1977, *2*, 221–240.

Barrett, B. H. Reduction in rate of multiple tics by free operant conditioning methods. *Journal of Nervous and Mental Disease*, 1962, *135*, 187–195.

Basmajian, J. V. Control and training of individual motor units. *Science*, 1963, *141*, 440–441.

Basmajian, J. V., Kukulka, C. G., Narayan, M. G., & Takebe, K. Biofeedback treatment of footdrop after stroke compared with standard rehabilitation technique: Effects on voluntary control and strength. *Archives of Physical Medicine and Rehabilitation*, 1975, *56*, 231–236.

Belan, D., & Cohen, J. L. The use of EMG feedback and progressive relaxation in the treatment of a woman with chronic low back pain. *Biofeedback and Self-Regulation*, 1979, *4*, 345–353.

Bilodeau, E. A., & Bilodeau, I. *Principles of skill acquisition*. New York: Academic Press, 1969.

Bird, B. L., Cataldo, M. F., Parker, L., Baker, T., & Francis, D. Generalization of EMG biofeedback in choreoathetoid cerebral palsy. *Biofeedback and Self-Regulation*, 1979, *4*, 263.

Bird, B. L., Parker, L. H., & Cataldo, M. F. Experimental analysis of EMG biofeedback in cerebral spasticity. *Biofeedback and Self-Regulation*, 1979, *4*, 261–262.

Black, A. H., Cott, A., & Pavloski, R. The operant learning theory approach to biofeedback training. In G. E. Schwartz & J. Beatty (Eds.), *Biofeedback theory and research*. New York: Academic Press, 1977.

Blanchard, E. B., & Young, L. D. Clinical applications of biofeedback training. *Archives of General Psychiatry*, 1974, *30*, 573–589.

Block, J. D., & Silverstein, L. Cerebral palsy: Integrating biofeedback/bioengineering approaches into a comprehensive cerebral palsy treatment center. *Archives of Physical Medicine and Rehabilitation*, 1978, *59*, 525.

Bowman, B. R., Baker, L. L., & Waters, R. L. Positional feedback and electrical stimulation: An automated treatment of the hemiplegic wrist. *Archives of Physical Medicine and Rehabilitation*, 1979, *60*, 497–502.

Brener, J. Factors influencing the specificity of voluntary cardiovascular control. In L. V. Dicara (Ed.), *Limbic and autonomic nervous system research*. New York: Plenum Press, 1974.

Brown, D. M., & Nahai, F. Biofeedback strategies of the occupational therapist in total hand rehabilitation. In J. V. Basmajian (Ed.), *Biofeedback: Principles and practice for clinicians*. Baltimore: Williams & Wilkins, 1979.

Brown, D. M., Nahai, F., Wolf, S., & Basmajian, J. V. Electromyographic feedback in the reeducation of facial palsy. *American Journal of Physical Medicine*, 1978, *57*, 183–189.

Brudny, J., Korein, J., Grynbaum, B. B., Friedmann, L. W., Weinstein, S., Sachs-Frankel, G., & Belandres, P. V. EMG feedback therapy: Review of treatment of 114 patients. *Archives of Physical Medicine and Rehabilitation*, 1976, *57*, 55–61.

Carlsson, S. G., & Gale, E. N. Biofeedback in the treatment of long-term temporomandibular joint pain. *Biofeedback and Self-Regulation*, 1977, *2*, 161–171.

Cataldo, M. F., Bird, B. L., & Cunningham, C. E. Experimental analysis of EMG feedback in treating cerebral palsy. *Journal of Behavioral Medicine*, 1978, *1*, 311–322.

Cleeland, C. S. Biofeedback and other behavioral techniques in the treatment of disorders of voluntary movement. In J. V. Basmajian (Ed.), *Biofeedback: Principles and practice for clinicians*. Baltimore: Williams, & Wilkins, 1979.

Connolly, K. The application of operant conditioning to the measurement and development of motor skill in children. *Developmental Medicine and Child Neurology*, 1968, *10*, 697–705.

Connolly, K. J. *Mechanisms of motor skill development*. New York: Academic Press, 1970.

Daniels, L., Williams, M., & Worthingham, C. *Muscle testing: Techniques of manual examination* (3rd ed.), Philadelphia: W. B. Saunders, 1972.

Denhoff, E., & Robinault, I. *Cerebral palsy and related disorders.* New York: McGraw-Hill, 1960.

Dunn, M., & Eads, D. Biofeedback assisted relaxation training in SCI: Clinical applications. *Proceedings of the Biofeedback Society of America Tenth Annual Meeting,* 1979, p. 252.

Dunn, M., Davis, J., & Webster, T. Voluntary control of muscle spasticity with EMG biofeedback in three spinal cord injured quadriplegics. *Biofeedback and Self-Regulation,* 1978, *3,* 228.

Evarts, E. Central control of movement. *Neuroscience Research Program Bulletin,* 1971, *9,* 1–139.

Fee, R. A., & Girdano, D. A. The relative effectiveness of three techniques to induce the trophotropic response. *Biofeedback and Self-Regulation,* 1978, *3,* 145–157.

Fernando, M. A., & Basmajian, J. V. Biofeedback in physical medicine and rehabilitation. *Biofeedback and Self-Regulation,* 1978, *3,* 435–455.

Finley, W. W., Niman, C., Standley, J., & Ender, P. Frontal EMG-biofeedback training of athetoid cerebral palsy patients: A report of six cases. *Biofeedback and Self-Regulation,* 1977, *2,* 59–79.

Finley, W. W., Niman, C. A., Standley, J. and Wansley, R. A. Electrophysiologic behavioral modification of frontal EMG in cerebral–palsied children. *Biofeedback and Self–regulation,* 1977, *2,* 59–79.

Fordyce, W. Psychological assessment and management. In F. Kresen, F. Kottke, & P. Ellwood (Eds.), *Handbook of physical medicine and rehabilitation.* Philadelphia: W. D. Saunders, 1971.

Forward, E. Patient evaluation with an audio electromyogram monitor: The "muscle whistler." *Physical Therapy,* 1972, *52,* 402–403.

Franz, S. I. *Nervous and mental reeducation.* New York: Macmillan, 1923.

Garrison, J. Stress management training for the handicapped. *Archives of Physical Medicine and Rehabilitation,* 1978, *59,* 580–585.

Gottlieb, H., Strite, L. C., Koller, R., Madorsky, A., Hockersmith, V., Kleeman, M., & Wagner, J. Comprehensive rehabilitation of patients having chronic low back pain. *Archives of Physical Medicine and Rehabilitation,* 1977, *58,* 101–108.

Grzesiak, R. C. Relaxation techniques in treatment of chronic pain. *Archives of Physical Medicine and Rehabilitation,* 1977, *58,* 270–272.

Halberstam, J. L., Zaresky, H. H., Brucker, B. S., & Guttman, A. Avoidance conditioning of motor responses in elderly brain-damaged patients. *Archives of Physical Medicine and Rehabilitation,* 1971, *52,* 318–336.

Hand, C. R., Burns, M. O., & Ireland, E. Treatment of hypertonicity of muscles of lip retraction. *Biofeedback and Self-Regulation,* 1979, *4,* 171–181.

Harris, F. A., Spelman, F. A., & Hymer, J. W. Electronic sensory aids as treatment for cerebral-palsied children. *Physical Therapy,* 1974, *54,* 354–365.

Harrison, A. Augmented feedback training of motor control in cerebral palsy. *Developmental Medicine and Child Neurology,* 1977, *19,* 75–77.

Harrison, A., & Connolly, K. The conscious control of fine levels of neuromuscular firing in spastic and normal subjects. *Developmental Medicine and Child Neurology,* 1971, *13,* 762–771.

Hefferline, R. F. The role of proprioception in the control of behavior. *Transactions of the N.Y. Academy of Science,* 1958, *20,* 739–764.

Hohman, L. B., Baker, L., & Reed, R. Sensory disturbances in children with infantile hemiplegia, triplegia, and quadriplegia. *American Journal of Physical Medicine,* 1958, *37,* 1–6.

Holt, K. S. Facts and fallacies about neuromuscular function in cerebral palsy as revealed by electromyography. *Developmental Medicine and Child Neurology,* 1966, *8,* 255–268.

Ince, L. P. Escape and avoidance conditioning of responses in the plegic arm of stroke patients: A preliminary study. *Psychonomic Science,* 1969, *16,* 49–50.

Inglis, J., Campbell, D., & Donald, M. Electromyographic biofeedback and neuromuscular rehabilitation. *Canadian Journal of Behavioral Science*, 1976, *8*, 299–323.

Jacobs, A., & Felton, G. S. Visual feedback of myoelectric output to facilitate muscle relaxation in normal persons and patients with nect injuries. *Archives of Physical Medicine and Rehabilitation*, 1969, *50*, 34–39.

Jacobson, E. *Progressive relaxation* (2nd ed.). Chicago: University of Chicago Press, 1938.

Jones, A. L., & Wolf, S. L. Treating chronic low back pain. *Physical Therapy*, 1980, *60*, 58–63.

Keats, S. *Cerebral palsy*. Springfield, Ill: Charles C. Thomas, 1970.

Keefe, F. J., & Surwit, R. S. Electromyographic biofeedback: Behavioral treatment of neuromuscular disorders. *Journal of Behavioral Medicine*, 1978, *1*, 13–24.

Kleinman, K., Keister, M., Riggin, C., Goldman, H., & Korol, B. Use of EMG feedback to inhibit flexor spasticity and increase active extension in stroke patients. *Psychophysiology*, 1976, *13*, 165.

Korein, J., Brudny, J., Grynbaum, B., Sachs-Frankel, G., Weisinger, M., & Levidow, L. Sensory feedback therapy of spasmodic torticollis and dystonia: Results in treatment of 55 patients. *Advances in Neurology*, 1976, *14*, 375–402.

Kottke, F. J. Therapeutic exercise. In F. Krusen, F. Kottke, & P. Ellwood (Eds.), *Handbook of physical medicine and rehabilitation*. Philadelphia: W. D. Saunders, 1971.

Kottke, F. J., Halpern, D., Easton, J. K., Ozel, A. T., & Burrill, C. A. The training of coordination. *Archives of Physical Medicine and Rehabilitation*, 1978, *59*, 567–572.

Kravitz, E., Moore, M., Glaros, A., & Stauffer, T. EMG feedback and differential relaxation training to promote pain relief in chronic low back pain patients. *Biofeedback and Self-Regulation*, 1978, *3*, 217.

Kukulka, C. G., Brown, D. M., & Basmajian, J. V. Biofeedback training for early finger joint mobilization. *American Journal of Occupational Therapy*, 1975, *29*, 469–470.

Levitt, S. *Physiotherapy in cerebral palsy*. Springfield, Ill: Charles C Thomas, 1962.

MacPherson, E. L. Control of involuntary movement. *Behavior Research and Therapy*, 1967, *5*, 143–145.

Marinacci, A. A. *Applied electromyography*. Philadelphia: Lea & Febiger, 1968.

Marshall, R. C., & Watts, M. T. Relaxation training: Effects on the communicative ability of aphasic adults. *Archives of Physical Medicine and Rehabilitation*, 1976, *57*, 464–467.

Middaugh, S. *Use of surface electromyography in patient evaluation, treatment planning, and treatment evaluation: Case studies.* Symposium, 52nd annual conference of the American Physical Therapy Association, New Orleans, June 25–July 1, 1976.

Middaugh, S. EMG feedback as a muscle reeducation technique: A controlled study. *Physical Therapy*, 1978, *58*, 15–22.

Middaugh, S. J., & Miller, M. C. EMG feedback in neuromuscular reeducation: Specific versus non-specific effects. *Biofeedback and Self-Regulation*, 1979, *4*, 270.

Middaugh, S. J. & Miller, M. C. Electromyographic feedback: Effect on voluntary muscle contractions in paretic subjects. *Archives of Physical Medicine and Rehabilitation*, 1980, *61*, 24–29.

Middaugh, S. J., Miller, M. C., Foster, G., & Ferdon, M. B. EMG feedback in neuromuscular reeducation: Specific effects on voluntary muscle contractions in normal subjects. *Proceedings of the Biofeedback Society of America*, 11th annual meeting, Colorado Springs, March 7–11, 1980.

Mims, H. W. Electromyography in clinical practice. *Southern Medical Journal*, 1956, *49*, 804–806.

Mroczek, N., Halpern, D., & McHugh, R. Electromyographic feedback and physical therapy for neuromuscular retraining in hemiplegia. *Archives of Physical Medicine and Rehabilitation*, 1978, *59*, 258–267.

Netsell, R., & Cleeland, C. S. Modification of lip hypertonia in dysarthria using EMG feedback. *Journal of Speech and Hearing Disorders*, 1973, *38*, 131–140.

Nouwen, A., & Solinger, J. W. The effectiveness of EMG biofeedback training in low back pain. *Biofeedback and Self-Regulation*, 1979, *4*, 103–111.

Peck, C. L., & Kraft, G. H. Electromyographic biofeedback for pain related to muscle tension. *Archives of Surgery*, 1977, *112*, 889–895.

Phillips, C. Tension headache: Theoretical problems. *Behavior Research and Therapy*, 1978, *16*, 249–261.

Reavley, W. The use of biofeedback in the treatment of writer's cramp. *Journal of Behavior Therapy and Experimental Psychiatry*, 1975, *6*, 335–338.

Rinehart, R. E. Physiologic approach to rheumatic disease. In E. Jacobson (Ed.), *Tension in medicine*. Springfield, Ill: Charles C Thomas, 1967.

Sachs, D. A., & Mayhall, B. Behavioral control of spasms using aversive conditioning with a cerebral palsied adult. *Journal of Nervous and Mental Disease*, 1971, *152*, 362–363.

Sachs, D. A., & Mayhall, B. The effects of reinforcement contingencies upon pursuit rotor performance by a cerebral palsied adult. *Journal of Nervous and Mental Disease*, 1972, *155*, 36–41.

Sachs, D. A., Martin, J. E., & Fitch, J. L. The effect of visual feedback on a digital exercise in a functionally deaf cerebral palsied child. *Journal of Behavior Therapy and Experimental Psychiatry*, 1972, *3*, 217–222.

Santee, J. L., Riggin, C. S., Kleinman, K. M., & Keister, M. E. Use of EMG feedback and monetary incentives to increase foot dorsifelxion in stroke patients. *Psychophysiology*, 1976, *14*, 88–89.

Seymour, R. J., & Bassler, C. R. Electromyographic biofeedback in treatment of incomplete paraplegia. *Physical Therapy*, 1977, *57*, 1148–1150.

Sherman, R. A. Successful treatment of one case of tardive dyskinesia with electromyographic feedback from the masseter muscle. *Biofeedback and Self-Regulation*, 1979, *4*, 367–370.

Shiavi, R. G., Champion, S. A., Freeman, F. R., & Bugel, H. J. Efficacy of myofeedback therapy in regaining control of lower extremity musculature following stroke. *American Journal of Physical Medicine*, 1979, *58*, 185–194.

Skrotzky, K., Gallenstein, J. S., & Osternig, L. R. Effects of electromyographic feedback training on motor control in spastic cerebral palsy. *Physical Therapy*, 1978, *58*, 547–552.

Sprenger, C. K., Carlson, K., & Wessman, H. C. Applications of electromyographic biofeedback following medial meniscectomy. *Physical Therapy*, 1979, *59*, 167–169.

Taub, E., & Berman, A. J. Movement and learning in the absence of sensory feedback. In S. J. Freedman (Ed.), *The neuropsychology of spatially oriented behavior*. Homewood, Ill.: Dorsey Press, 1968.

Trombly, C. Principles of operant conditioning: Related to orthotic training of quadriplegic patients. *American Journal of Occupational Therapy*, 1966, *5*, 217–220.

Trotter, A. B., & Inman, D. A. The use of positive reinforcement in physical therapy. *Physical Therapy*, 1968, *48*, 347–352.

Twitchell, T. E. On the motor deficit in congenital bilateral athetosis. *Journal of Nervous and Mental Disease*, 1959, *129*, 105–132.

Wannstedt, G. T., & Herman, R. M. Use of augmented sensory feedback to achieve symmetrical standing. *Physical Therapy*, 1978, *5*, 553–559.

Wolf, S. L., Baker, M. P., & Kelly, J. L. EMG biofeedback in stroke: Effect of patient characteristics. *Archives of Physical Medicine and Rehabilitation*, 1979, *60*, 96–102.

Wolf, S. L., Basmajian, J. V., Russe, T. C., & Kutner, M. Normative data on low back mobility and activity levels. *American Journal of Physical Medicine*, 1979, *58*, 217–229.

Wooldridge, C. P., & Russell, G. Head positioning training with the cerebral palsied child: An application of biofeedback techniques. *Archives of Physical Medicine and Rehabilitation*, 1976, *57*, 407–414.

Yu, J. Functional recovery with and without training following brain damage in experimental animals: A review. *Archives of Physical Medicine and Rehabilitation*, 1976, *57*, 38–41.

THERAPEUTIC APPROACHES TO SPECIFIC DISORDERS

CHAPTER 8

The Behavioral Assessment and Treatment of Essential Hypertension

I. KEITH ORTON, IRVING BEIMAN, AND
ANTHONY R. CIMINERO

INTRODUCTION

Essential hypertension is diagnosed when no organic cause for the presence of elevated blood pressure (BP) can be determined. It is estimated to account for 90% of the approximately 25 million cases of hypertension in this country (Gutmann & Benson, 1971; Kannel & Dawber, 1973). Evidence indicates that, when left untreated, hypertension leads to the development of serious cardiovascular disease (Kannel, 1976), which constitutes the main underlying cause of mortality and morbidity in the United States (Kannel & Dawber, 1973). It is this relationship between hypertension and the later development of cardiovascular disease that has created increasing interest in the development of effective assessment and treatment procedures for essential hypertension.

In spite of the prevalence and widespread interest in essential hypertension, its assessment and treatment continues to be problematic for traditional medicine (Dunn & Freeman, 1975; Kannel, 1976; Langfeld,

I. KEITH ORTON • Good Samaritan Hospital and Medical Center, Portland, Oregon 97210.
IRVING BEIMAN • Farr Associates, Greensboro, North Carolina 27401.   ANTHONY
R. CIMINERO • Veterans Administration Medical Center, Miami, Florida 33125.

1973). Many hypertensive individuals go undetected and many recognized hypertensives go untreated, even though the early detection and treatment of hypertension is believed to be the single most important prophylaxis for cardiovascular disease (Kannel, 1976). The detection and treatment of hypertension is made more difficult because it is an asymptomatic or silent disease in its early stages. Since elevated blood pressure often does not cause any immediate physical discomfort, many hypertensive individuals believe and feel that they are in good health. This asymptomatic process of hypertension, along with the undesirable side effects often produced by antihypertensive medications, contribute to the difficulty of treating essential hypertension in a conventional medical manner.

Within the last 8 years, behavioral scientists have become increasingly involved in the development of assessment and treatment procedures for essential hypertension. Research efforts have included attempts to specify the various physiological (Brod, 1971; Obrist, 1976; Obrist, Lawler, Howard, Smithson, Martin, & Manning, 1974), personality (Harris & Forsyth, 1973), and behavioral and environmental (Gutmann & Benson, 1971; Weiner, 1977) factors possibly contributing to the development and maintenance of essential hypertension. More recently, there has been increasing interest in the development of behavioral treatments for essential hypertension that provide a safe and effective adjunct or alternative to traditional medical practices (Frumkin, Nathan, Prout, & Cohen, 1978; Jacob, Kraemer, & Agras, 1977; Shapiro, Schwartz, Ferguson, Redmond, & Weiss, 1977).

ASSESSMENT OF ESSENTIAL HYPERTENSION

Medical Assessment

The determination that elevated BP levels in an individual patient result from essential hypertension and are not symptomatic of some other disease process is a difficult one. Primary renal disease, renovascular hypertension, Conn's syndrome, and Cushing's disease are only a few of the diseases that cause hypertension (Weiner, 1977). A thorough medical workup, including medical history, physical evaluation, and basic laboratory tests, is essential in order to determine the organic causes of elevated BP with the greatest certainty (Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure, 1977). There are numerous issues surrounding the diagnosis of essential hypertension, which due to space limitations will only be mentioned briefly here.

There is a lack of consensus on most aspects of essential hypertension, with the exceptions that the disease consists of elevated BP, that at some point during the course of the disease peripheral resistance is in-

creased, and that, in most cases, genetic factors play some role in its etiology (Weiner, 1977). The precise dividing line between normotensive and hypertensive BP levels has been defined somewhat arbitrarily. For the purpose of epidemiological research, the World Health Organization (1962) established the criteria that any BP level greater than 160 mmHg systolic and/or 95 mmHg diastolic is to be considered hypertensive. Borderline hypertension is thought to include BP levels of 140–160 mmHg systolic and/or 90–95 mmHg diastolic and is estimated to make up 70% of the total hypertensive population (Kannel & Dawber, 1973). Evidence indicates that borderline hypertensives are more likely to develop elevated BP levels (Weiner, 1977). Another category, referred to as *labile hypertension*, has been established for those individuals who show excessive spontaneous variability, increased bp responsiveness to various stimuli, and transient hypertension (Conway, 1970). Labile hypertension has been identified as a potential first stage in the process of developing fixed essential hypertension (Frohlich, Kozul, Tarazi, & Dustan, 1970).

The precise hemodynamic mechanisms functioning to maintain the elevated BP levels in fixed essential hypertension are not yet fully understood. No one hemodynamic pattern can account for hypertension, but arterial BP is believed to be a function of cardiac output and total peripheral vascular resistance (Weiner, 1977). Brod (1971) pointed out the hemodynamic similarities between resting hypertensive individuals and normotensive individuals subjected to acute emotional upset. He hypothesized that essential hypertension results from the disturbed regulation of the once adaptive hemodynamic reaction to stress, which has been labeled the fight-or-flight response. In response to stressful stimuli, changes in both cardiac output and total peripheral resistance occur. The precise central and peripheral regulatory mechanisms are not understood, but the influence of the sympathetic nervous system during the early stages of hypertension have been suggested (Obrist *et al.*, 1974). The hypothalamus has been implicated in the defense reaction, along with the autonomic nervous system, which controls both heart rate and peripheral resistance (Patel, 1977; Weiner, 1977). Although the specific mechanisms involved in the development and maintenance of high BP have not yet been elucidated, it seems likely that autonomic stereotype, as discussed by Lacey and Lacey (1958), might help explain why some individuals develop hypertension. According to this theory, individuals appear to respond to stress with a particular physiological response pattern, and it is this response that occurs consistently even though stimulus conditions or stressors vary. Thus, individuals might be BP responders, just as there are muscle tension reactors, gastrointestinal reactors, and so on.

Other factors have been identified as being associated with elevated BP, and it is recommended that they be assessed prior to treatment. A positive family history for hypertension is one factor that appears to be consistently associated with the development of high BP. It has not been demonstrated conclusively that a predisposition for hypertension is

transmitted genetically, but this is a popular notion that is widely dis-cussed (Kannel & Dawber, 1973; Weiner, 1977). Additional factors that should probably be considered during assessment are excessive salt in-take, cardiovascular risk factors (diabetes, cigarette smoking), and whether or not the patient is taking birth control pills (Report of the Joint Committee, 1977). Although the data supporting the role of obesity, salt intake, and cigarette smoking as contributors to elevated BP are conflict-ing (Weiner, 1977), it seems appropriate for health professionals to en-courage their clients to behave in ways that facilitate good health rather than hinder it.

Behavioral Psychological Assessment

The assessment of client characteristics is intended to provide in-formation useful in the prediction and identification of individuals prone to develop or currently suffering from essential hypertension. Additionally, when adequately specified, client characteristics can aid in the selection of appropriate strategies for the treatment of hypertension. It has been recommended that information for the purpose of psychologi-cal assessment of hypertensive individuals be presented according to physiological, behavioral, and self-report response systems from which the data has been gathered.

Physiological Assessment

The assessment of arterial BP is the most commonly used physiolog-ical variable in both medical and psychological evaluation of hyperten-sion. The reliable recording of BP is hampered by the variability inherent in this response system but is crucial because BP levels are the sole diagnostic determinant of essential hypertension. Guidelines for particu-lar technical aspects of BP recording (apparatus, procedures, etc.) have been provided by the World Health Organization (1962) to facilitate stan-dardization. However, other factors such as the number of BP recordings obtained and the length of the baseline assessment period also need to be specified and standardized if research findings using this measure are to be replicable.

With only a few exceptions (e.g., Beiman, Graham, & Ciminero, 1978a; Blackwell, Bloomfield, Gartside, Robinson, Hanenson, Magenheim, Nidich, & Zigler, 1976) most BP assessment takes place in a medical setting or psychology clinic. A salient criticism leveled against most of the research designed to evaluate the efficacy of behavioral treatment procedures in reducing elevated BP has been the failure to demonstrate the generalization of BP reductions across multiple settings (Frumkin et al., 1978). In addition to demonstrating the generalizability of BP reductions, a second convincing reason for obtaining BP recordings

in multiple settings has recently been reported. Beiman, Graham, and Ciminero (1978b) reported the treatment of a client with what they labeled *reactive hypertension*. They demonstrated BP reduction in both the psychology clinic and the client's natural environment following progressive relaxation training, though BP recordings obtained in the medical setting remained hypertensive. Based on the BP recordings from these three settings, it was hypothesized that this client was experiencing a conditioned anxiety response to specific stimuli within the medical setting. Using a hierarchy developed from such stimuli, the client was treated with systematic desensitization that resulted in BP reductions in the medical environment. Blood pressure recordings from multiple settings provide valuable assessment information that contributes to treatment selection but also contribute methodologically to the external validity of the research findings (Paul, 1969a).

The role of self-monitoring as an assessment and treatment technique has been widely discussed (Ciminero, Nelson, & Lipinski, 1977; Thoreson & Mahoney, 1974). The use of self-monitoring in the assessment of essential hypertension is not widely reported, but it has been used to obtain BP recordings in multiple settings. Through the use of self-monitoring, it has been demonstrated that among 112 patients with clinic BP recordings in the borderline range, 28% had clearly normotensive pressures at home (Julius, Ellis, Pascuel, Matice, Hansson, Hunyor, & Sandler, 1974). Although self-monitoring is known to have reactive affects, often producing therapeutic results, the therapeutic value of self-monitoring BP is still unclear (Carnahan & Nugent, 1975). It seems that, in most cases, self-monitoring is of value as an assessment procedure, although its usefulness as a treatment procedure remains to be determined.

More complex assessment procedures require more elaborate devices such as a polygraph and usually take place in a laboratory setting. There is a great deal of literature reporting the psychophysiological correlates of essential hypertension (Weiner, 1977). Brod (1963) demonstrated the "protracted pressor response" experienced by hypertensive patients who are exposed to stressful stimuli. This feature of a hypertensive's physiological response to stress was later used by Patel (1975) to evaluate the effectiveness of a biofeedback-aided meditation procedure in the treatment of hypertension. She found that the absolute increases in BP and the duration of the pressor response were significantly reduced in patients receiving treatment. It appears that this feature of a hypertensive's hemodynamic responses to stress can provide a useful outcome measure and perhaps aid in the initial assessment of hypertension.

Recently, investigators have reported the use of serum dopamine-beta-hydroxylase (DBH) levels as a dependent variable to evaluate a treatment's effectiveness in reducing BP (Stone & DeLeo, 1976). The DBH level is purported to be an indicator of peripheral adrenergic activity,

which has been implicated in sympathetic nervous system arousal. This is another physiological variable that could prove useful in the assessment of essential hypertension.

Behavioral Observation

The direct observation of an individual's behavior by an independent observer has received little attention as an assessment procedure for essential hypertension. Consequently, the relationship between overt motor responses and the development and/or maintenance of elevated BP levels remains unclear. However, progress is being made in the assessment of coronary-prone behavior patterns that might prove to have implications for the assessment of essential hypertension.

As investigations of both essential hypertension and type A behaviors (competitiveness, hostility, sense of time urgency, etc.) have accumulated, a relationship between them seems to unfold. Essential hypertension is associated with the development of cardiovascular diseases in general (Kannel, 1976), whereas type A behaviors have been linked to a specific cardiovascular disease, coronary heart disease (Brand, Rosenman, Sholtz, & Friedman, 1976). Excessive arousal in the sympathetic branch of the autonomic nervous system has been implicated in the pathogenesis of both essential hypertension (Brod, 1971) and coronary heart disease (Dembroski, MacDougall, Shields, Petitto, & Lushene, 1978). Although hypertension is not a necessary characteristic of type A men, it has been demonstrated that when type A men are exposed to stress they experience a significantly larger rise in systolic BP than type B men (Dembroski *et al.*, 1978; Manuck, Craft, & Gold, 1978). Although failing to obtain statistical significance, systolic and diastolic BP reductions have been reported when type A individuals are treated with Anxiety Management Training (Suinn & Bloom, 1978). It may be that type A behaviors do contribute to sympathetic arousal, which in some individuals results in essential hypertension. It is this potential relationship that makes the assessment of type A behaviors relevant to this discussion.

Typically, determination of the type A behavior pattern is based on subjective judgment following a standardized interview (Rosenman, Friedman, Straus, Wurm, Kositchek, Haan, & Werthessen, 1964). Independent observers are now being utilized to evaluate individual speech characteristics to provide a quantifiable basis on which to make the classification of behavior type (Scherwitz, Berton, & Leventhal, 1977; Schucker & Jacobs, 1977). Voice volume, speed of speech, speed of answering, and voice emphasis are some of the speech characteristics useful in discriminating the type A individual. Another behavioral feature of type A individuals is that they estimate one minute to pass more quickly than do type B individuals, displaying their characteristic sense of time urgency (Burman, Pennebaker, & Glass, 1975). These procedures, or ones like them, have not yet been applied to the assessment of hypertension.

They offer a methodology and theoretical framework that may prove useful in assessing the behavioral correlates of essential hypertension.

Self-Report Data

Information obtained from interviews and objective testing has provided relatively little consistent empirical support for the existence of a hypertensive personality (Harris & Forsyth, 1973; Weiner, 1977). However, some data have accumulated supporting the psychodynamic view that unexpressed anger and hostility are the basic emotions underlying sustained elevations in BP (Schachter, 1957; Wolf & Wolf, 1951). Additionally, hypertensive individuals have been noted to be nonassertive (Gressel, Shobe, Saslow, Dubois, & Schroeder, 1949) and anxious (Sakolow, Werdegar, Perloff, Cowan, & Brenenstuhl, 1970). It is also useful to assess for certain demographic variables (e.g., urban vs. rural population, racial background, rate of cultural changes, and socioeconomic mobility) that have been related to a higher incidence of elevated BP (Gutmann & Benson, 1971). Due to inconsistent experimental findings, the precise roles these variables play in the development and maintenance of high BP are unclear. Therefore, the importance of measuring these variables with self-report devices has not been established.

Based on this information, when conducting psychological evaluations of hypertensive patients, it would seem useful to specify the various anxiety-provoking or stressful situations they encounter and their response competencies in dealing with those situations. Numerous pencil-and-paper measures are available to supplement interview data surrounding the issues discussed here.

Conclusions

The early detection of elevated BP is an important aspect of the successful treatment of essential hypertension. Labile hypertension is believed to be the first stage in the process of developing sustained BP increases and may prove to be an optimal stage to initiate behavioral interventions. The use of BP screening clinics, with scheduled follow-up BP checks for individuals with hypertensive readings, are being utilized to aid in the detection of hypertensive and potentially hypertensive individuals. These screening clinics not only serve to provide BP recordings for people who might not otherwise obtain them but also are useful educational tools to increase the public's awareness regarding the need for regular BP checks.

Once hypertension has been identified, it is crucial to obtain a thorough medical workup to rule out any possible organic factors causing elevated BP. Research indicates that BP recordings from multiple environmental settings (e.g., home, work, school) contribute to establishing the diagnosis and the selection of treatment procedures (Beiman *et al.*,

1978b; Julius *et al.*, 1974). More elaborate laboratory procedures using multichannel physiological assessments can be useful in identifying the arousal properties of various environmental stimuli that contribute to reactive hypertension.

Techniques used in the behavioral observation and assessment of type A coronary-prone behaviors might prove useful in the development of procedures for the behavioral assessment of essential hypertensives. Anger- and fear-provoking situations have been demonstrated to result in BP increases and might provide data valuable in the behavioral assessment of hypertensive individuals. Any situations that are anxiety-provoking or stressful could provide additional data valuable in understanding hypertension.

At present, the client characteristics associated with hypertensive individuals do not contribute greatly to the prediction or early detection of hypertension. Only minor gains have been established in determining the choice of treatment. But, with continued research, it may be possible to utilize variables other than BP in the identification of individuals prone to developing elevated BP. Additionally, treatment selection within both medicine and psychology might be based on client characteristics. At this time, however, research has only provided a rough framework on which to base such decisions.

TREATMENT APPROACHES FOR ESSENTIAL HYPERTENSION

Medical Treatment

The most common form of medical treatment for essential hypertension is pharmacological. The Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure (1977) recommended that antihypertensive drug therapy be initiated in "virtually all patients" with diastolic pressures of 105 mmHg or greater. With diastolic pressures of 90–104 mmHg, the joint commission recommended individualized treatment based on the various risk factors (e.g., family history, sex, age) of the patient. The large controlled-outcome studies of the Veterans Administration Cooperative Group (1967, 1970) have demonstrated the pharmacological treatment of hypertension to be effective in reducing both the morbidity and mortality associated with the disease. It has become clear that the higher the level of BP, the greater the benefit of antihypertensive drug therapy.

The stepped-care approach is the current treatment regimen recommended by the Report of the Joint Commission (1977). According to the stepped-care approach, a thiazide-type diuretic like hydrochlorothiazide (Hydrodiuril or Esidrix), used to reduce blood volume, is the first drug utilized in the treatment of high BP. The next step, if the therapeutic goal

is not reached using the diuretic alone, is to add a sympathetic blocking agent like propranolol (Inderal), methyldopa (Aldomet), or reserpine. Except for propranolol, which inhibits renin production, the sympathetic blocking agents act to impede vasoconstrictive reflexes. Hydralazine hydrochloride (Apresoline) is the drug advised for the third step, to be used in conjunction with the diuretic and sympathetic blocking agent if they do not reduce BP to the therapeutic goal. For resistant cases of elevated BP, when the hypertension persists following the first three stages in this approach, guanethidine sulfate can be added to the regimen or can replace the sympathetic blocking agent. Each of these steps is begun with low dosage levels of the chosen medication. The dosage levels are increased gradually until (1) the therapeutic effect is achieved, (2) the maximum dose is reached, or (3) the side effects of the medications begin interfering with treatment. In addition to antihypertensive agents, the joint commission stresses the importance of patient education to increase patient compliance in following the recommended treatment. A low sodium diet and weight reduction programs are also advised.

It is important for any professional working with hypertensive patients to be familiar with the common side effects of antihypertensive agents. The diuretics are the most frequently used antihypertensive medication (Dalske & Wolf, 1975). They are known to give rise to gastrointestinal irritation, weakness, drowsiness, photosensitivity, diarrhea, and nausea. The medications used in steps two, three, and four of the stepped-care approach produce more serious side effects. Reserpine and methyldopa can both cause sedation, drowsiness, and depression. A few of the other symptoms produced by antihypertensive agents include insomnia, headache, tachycardia, impotency, and loss of ability to ejaculate (Dalske & Wolf, 1975; Report of the Joint National Commission, 1977).

When these undesirable side effects are combined with a disease process that is basically asymptomatic, a problem in treatment compliance is created. A dropout rate as high as 74% has been reported for patients receiving antihypertensive medications (Caldwell, Cobb, Dowling, & Jough, 1970). Caldwell et al. (1970) concluded that the patients remaining in treatment had learned through personal experience, either hypertensive emergencies of their own or by observing a family member with hypertension, that regular attendance to hypertension clinic was advisable. These researchers also emphasized the role of patient education, along with a strong doctor–patient relationship, as methods of increasing patient compliance to the sometimes lifelong pharmacological treatment of hypertension.

Behavioral Treatments

The behavioral treatments receiving the most empirical attention as potential nonpharmacological approaches to essential hypertension are the biofeedback and relaxation procedures. The number of investigations

examining the effectiveness of these behavioral procedures has dramatically increased in recent years. Several thorough literature reviews have been published focusing on biofeedback (Blanchard & Epstein, 1978; Schwartz & Shapiro, 1973), relaxation methods (Jacob et al., 1977), and the behavioral interventions in general (Blanchard & Miller, 1977; Frumkin et al., 1978; Shapiro et al., 1977). Biofeedback and relaxation procedures will be discussed in detail. Comparative treatment studies and complex treatment techniques will then be reviewed.

Biofeedback Procedures

Biofeedback (discussed in detail in Chapter 5) has been described as a procedure designed to detect and amplify biological responses so they can be immediately displayed to the subject in an easily understandable form (Blanchard & Epstein, 1978). In the treatment of essential hypertension, the purpose of biofeedback training is to teach individuals to develop self-control of their BP responses. Although neither the central nor the peripheral mechanism involved in the regulation of BP is completely understood (Weiner, 1977), when BP feedback is provided it is likely that heart rate, stroke volume, and peripheral resistance are differentially involved (Shapiro et al., 1977). Through the use of individualized strategies, biofeedback will ideally facilitate the development of self-control as a habitual and automatic process in the daily lives of hypertensive individuals (Schwartz & Shapiro, 1973).

Biofeedback is offered almost exclusively in a laboratory setting. One study has been reported in which hypertensive patients were taught to use standard BP-monitoring equipment to obtain BP feedback in their own homes (Kristt & Engel, 1975). The equipment used in the laboratory setting varies both in its complexity and in the type of feedback provided. Tursky, Shapiro, and Schwartz (1972) reported the development of an automated constant cuff-pressure system that provided binary (i.e., yes or no) feedback on a heartbeat-to-heartbeat basis. This feedback system has been widely used with good results (Benson, Shapiro, Tursky, & Schwartz, 1971; Goldman, Kleinman, Snow, Bidus, & Karol, 1975; Kristt & Engel, 1975). Other systems providing intermittent BP recordings (Elder, Ruiz, Deabler, & Dillenkoffer, 1973) and proportional feedback (i.e., graphing BP changes) (Blanchard, Young, & Haynes, 1975) have also been reported to successfully reduce BP in the laboratory.

Although, there are at this time no comparative data indicating which feedback system is the most effective for treating hypertensive patients, some clarification has taken place. Elder et al. (1973) demonstrated that social reinforcement, when accompanying instructions to lower BP and BP feedback, contributes to greater BP reductions than when only instructions and BP feedback are provided. Elder and Eustis (1975) found that massed training was more effective in teaching patients to lower BP than training that was distributed over a number of weeks.

Continuous binary feedback has been demonstrated to facilitate BP control more effectively than intermittent or continuous forms of proportional feedback in normotensive subjects (Shannon, Goldman, & Lee, 1978).

Just as the feedback techniques and procedures vary, so do the magnitudes of reported BP changes. When systolic BP feedback has been provided to hypertensive patients, average reductions in systolic BP have ranged from 18 mmHg (a 12% reduction in initial BP following treatment: Percentage = posttreatment mean BP minus pretreatment mean BP divided by pretreatment mean BP, which denotes percentage reduction in initial BP following treatment) (Kristt & Engel, 1975) to 8 mmHg (5%) (Goldman et al., 1975). Large reductions in systolic BP have been reported by other investigators utilizing systolic BP feedback (Benson et al., 1971; Blanchard et al., 1975). Elder et al. (1973) utilized diastolic BP feedback, stating that diastolic BP control is clinically more relevant in hypertension then systolic control. An average diastolic reduction of 21 mmHg (20%) was reported for the six hypertensive patients given their most potent biofeedback treatment. A later extended replication of this study produced less impressive diastolic BP decreases of 7.5 mmHg (9%) (Elder & Eustis, 1975). Smaller, yet statistically significant, decreases in both systolic (Brener & Kleinman, 1970; Fey & Lindholm, 1975) and diastolic (Shapiro, Schwartz, and Tursky, 1972) BPs have been demonstrated in normotensive subjects. In spite of the demonstration of BP reductions with biofeedback, its clinical utility in the treatment of hypertension remains questionable (Frumkin et al., 1978; Schwartz & Shapiro, 1973; Shapiro et al., 1977).

There are numerous methodological problems limiting the generalization of the research findings supporting the effectiveness of biofeedback. There is a need to standardize the administration of biofeedback procedures, especially in the collection of baseline data (Shapiro et al., 1977). Additionally, when biofeedback research is reproted great pains are taken to describe the bioteedback equipment in detail but little is mentioned regarding the therapist–client interactions including the conceptualization presented, client expectations, and so forth (Meichenbaum, 1977b). Adequate follow-up data have not been reported in the biofeedback research, with the longest follow-up period being 2–3 months (Elder & Eustis, 1975; Kristt & Engel, 1975). The methodological shortcomings present in the biofeedback research become increasingly damaging to the research findings because of the small number of patients included in most of the studies.

The differential response of patients to biofeedback indicates the need tor individualized treatment programs. Because the client characteristics of the responsive patient remain largely unknown, there is a need tor careful assessment. The use of biofeedback as an adjunct to other behavioral interventions (i.e., relaxation training) has been recommended by Schwartz and Shapiro (1973). The research conducted thus far has been

of great heuristic value, and, as research efforts continue to investigate additional biofeedback methods (i.e., electromyography, skin resistance response, pulse transit time, etc.), the usefulness of the procedure in the treatment of hypertension will become more clear.

Relaxation Procedures

A wide variety of relaxation procedures has been employed to bring about reductions in BP. Each of these procedures, ranging from transcendental meditation (TM) (Benson, Rosner, Marzetta, & Klemchuk, 1974a; Blackwell *et al.*, 1976) to progressive muscle relaxation (PMR) (Beiman *et al.*, 1978a,b; Taylor, Farquhar, Nelson, & Agras, 1977), is intended to alter the responsiveness of the sympathetic nervous system to environmental events. Persistent elevations in BP are hypothesized to result from repeated exposure to environmental stress, which results in chronic sympathetic nervous system arousal (Brod, 1971). The ultimate objective of the relaxation procedures used in the treatment of essential hypertension is to reduce the maladaptive sympathetic arousal that, if left uncontrolled, can result in relatively damaging physiological changes.

There is an increasing amount of experimental evidence indicating that reductions in sympathetic arousal do result from the daily practice of relaxation procedures. During a meditative state, individuals who have regularly practiced a technique such as TM have been reported to undergo such physiological changes as decreased oxygen consumption, carbon dioxide elimination, and decreased heart rate, while skin resistance and alpha wave activity have increased (Beary, Benson, & Klemchuk, 1974; Wallace, Benson, & Wilson, 1971). Progressive muscle relaxation has been reported to reduce tonic levels of physiological arousal and subjective tension in both unselected subjects (Paul, 1969b) and self-referred clients suffering from tension and anxiety (Beiman, Israel, & Johnson, 1978). Live PMR has been reported to lead to enhanced self-control over autonomic arousal after training has been completed (Beiman, Israel, & Johnson, 1978). Relaxation procedures such as meditation and muscle relaxation techniques appear to have antisympathetic effects contributing to their effectiveness in reducing elevated BP.

In addition to the reductions in sympathetic arousal obtained through the regular practice of these procedures, individuals report improved sleeping patterns, decreased anxiety, and the sense of being better able to deal with the daily stresses of life (Beiman, Israel, & Johnson, 1978; Blackwell *et al.*, 1976; Deabler, Fidel, Dillenkoffer, & Elder, 1973). Although numerous undesirable side effects are known frequently to accompany the pharmacological treatment of hypertension, the most frequently used behavioral interventions appear to contribute to a beneficial feeling of well-being.

The relaxation procedures used in the treatment of high BP all appear to influence the autonomic nervous system in similar ways but utilize

different techniques to achieve these results. Hatha yoga (Dately, Dashmukh, Dalvi, & Vinekar, 1969), Zen meditation (Stone & DeLeo, 1976), and Transcendental Meditation (TM) (Benson *et al.*, 1974a; Blackwell *et al.*, 1976) are some of the passive relaxation procedures reported to lower BP levels. According to Benson (1975), these relaxation methods share the common elements of a quiet environment, attentional focus, passive attitude toward obtaining a relaxed state, and a comfortable body posture.

Unlike the meditation techniques that facilitate passive relaxation, PMR is an active procedure during which various muscle groups are alternately tensed and relaxed. This procedure was developed by Jacobson (1934) to aid in making the discrimination between feelings of tension and relaxation that contributes to reducing muscular tension. Jacobson's original procedure has since been modified by other researcher-clinicians (Bernstein & Borkovec, 1973; Wolpe & Lazarus, 1968). Progressive relaxation training, as described by Bernstein & Borkovec (1973), includes the steps of "relaxation through recall" and "differential relaxation," which do not require the usual tension release technique. These additional steps facilitate the use of this relaxation procedure as a self-control technique when confronted with maladaptive tension and anxiety during daily activities (Goldfried & Trier, 1974).

The meditation techniques are normally practiced one or two times daily, for periods of 15–20 minutes. The beneficial hypometabolic state is believed to last throughout the day. Progressive muscle relaxation, on the other hand, is usually practiced twice daily for approximately 15 minutes until a desired level of relaxation can be achieved easily at home. Then the self-control procedures are included and the client is instructed to practice them periodically throughout the day.

The majority of experiments conducted to examine the effectiveness of specific meditational techniques in treating hypertension are single-group outcome studies with subjects serving as their own controls. The results of these studies should be interpreted cautiously due to the lack of adequate control groups and because patients were frequently taking variable amounts of antihypertensive medications. The largest average BP reductions reported for nonmedicated hypertensive patients who practiced meditation were 37 mmHg (20%) in systolic BP and 23 mmHg (21%) in diastolic pressure (Dately *et al.*, 1969). For medicated patients, the largest average BP reductions were 10.6 mmHg (7%) (Benson, Rosner, Marzetta, & Klemchuk, 1974b) and 9.3 mmHg (9%) (Dately *et al.*, 1969) in systolic and diastolic pressures, respectively.

Stone and DeLeo (1976) conducted the only controlled group outcome study designed to investigate a single meditative procedure. They reported average reductions of 9 mmHg (6%) and 8 mmHg (9%) for systolic and diastolic BPs, respectively. Although they included nonmedicated patients and a control group, the findings must be considered tentative because patients were assigned to groups in a nonrandom manner and the groups were different sizes. Pollack, Weber, Case, and Laragh

(1977) reported the only study with findings that conflict with those of previous studies. They reported that 6 months following TM training all reductions in BP obtained in the beginning of training had been lost. Other studies have reported either no follow-up (Dately et al., 1969) or that the obtained reductions were increased or maintained as long as the patients continued to practice the techniques (Benson et al., 1974a,b; Blackwell et al., 1976; Stone & DeLeo, 1976).

There are only a few studies reported that specifically investigated the effectiveness of PMR in the treatment of essential hypertension. Jacobson (1939) was the first investigator to report in-session BP reductions in hypertensive patients who practiced PMR. In session reductions of 13 mmHg and 11 mmHg for systolic and diastolic BPs, respectively, were obtained, but no attempt was made to determine whether these reductions were maintained following training. Additional single-case design research has contributed data supporting the notion that BP reductions achieved through PMR can be maintained following training (Beiman et al., 1978a; Brady, Luborsky, & Kron, 1974; Graham, Beiman, & Ciminero, 1977).

Beiman et al. (1978a) reported clinically significant reductions for both systolic and diastolic BP in two unmedicated clients who were taught to use progressive relaxation training á la Bernstein and Borkovec (1973) as a self-control skill. The clients were instructed to use anxiety-related cognitions, behaviors, and situations, generally associated with themes of hostility, competition, and sense of time urgency, as prompts to utilize the relaxation skills they had learned. Both clients monitored their BPs in their natural environments (e.g., work, school, home) in addition to recordings obtained in a psychology clinic. Client A had been previously treated unsuccessfully with four antihypertensive medications (both sequentially and in combination), whereas client B had refused to comply with any form of pharmacological treatment. From baseline to the end of treatment, client A's mean systolic/diastolic BP decreased 14.9/15.9 mmHg (11%/16%). Client B's BP showed mean reductions of 17.5 mmHg (11%) in systolic and 9.4 mmHg (10%) in diastolic BP. These reductions were reported to be maintained at 6 months (client A) and 2 months (client B) following the termination of training.

Additional studies exploring the use of relaxation procedures in the treatment of hypertension have been reported (Deabler et al., 1973; Taylor et al., 1977). These studies employed more complex and sophisticated experimental designs intended to provide comparative data and to examine the use of multiple behavioral interventions used in combination.

Comparative Studies and Complex Treatments

The relative effectiveness of these specific behavioral approaches to the treatment of essential hypertension is being elucidated as the number

of well-controlled group outcome studies reported in the literature increases. Taylor *et al.* (1977) investigated the relative effectiveness of PMR, a nonspecific therapy, and medical treatment only in reducing the BP of patients receiving antihypertensive medication. The patients assigned to the nonspecific therapy spent the same amount of time with a therapist as the patients taught PMR, but they were not instructed in any specific treatment. The results indicated that relaxation training plus medical treatment was more effective in reducing elevated BP than either of the other two experimental groups. Following 5 weeks of treatment, with one session per week, the relaxation group showed average reductions of BP of 13.6/4.9 mmHg (9%/5%) for systolic/diastolic pressures. The nonspecific-therapy and medical-treatment-only groups showed reductions of 2.8 (2%) and 1.1 (.7%) mmHg systolic and 1.8 (2%) and 0.3 (.3%) mmHg diastolic BP, respectively. At a 6-month follow-up, the average BP of the relaxation group was relatively unchanged from posttreatment levels, whereas the nonspecific-therapy and medical-treatment-only groups displayed a tendency for continued improvements.

A biofeedback-aided meditation technique developed by Patel (1975, 1977) has been demonstrated to successfully lower BP in hypertensive patients. Numerous studies have been conducted examining this combined treatment, but the study with the tightest experimental design was reported by Patel and North (1975). In this study, patients were assigned randomly to either the biofeedback-aided meditation procedure or a general-relaxation group. Patients receiving the active treatment (i.e., biofeedback-aided meditation) were educated about hypertension and provided a rationale for the use of relaxation and biofeedback in its treatment. A sequential-treatment regimen was used first to teach the patients muscular relaxation and TM. Following this, patients were provided various forms of biofeedback (i.e., skin resistance and electromyography). Additionally, patients were encouraged to practice the relaxation technique twice daily and to incorporate relaxation into their daily activities. The control group (i.e., general relaxation) was told to relax but was not given instructions regarding a specific technique or provided biofeedback. Average reductions for systolic/diastolic pressures were 26/15 mmHg (16%/15%) for the treated group and 9/4 mmHg (5%/4%) for the control group. The differences between the treated and control groups were statistically significant for both systolic and diastolic pressures. These reductions in BP were maintained throughout a 6-month follow-up period. A treatment combination of PMR and hypnosis was reported by Deabler *et al.* (1973) that also resulted in significant decreases in both systolic and diastolic BP.

Studies such as these reporting the use of combination or multifaceted treatments do not provide information regarding the most potent component of the treatments. Fey and Lindholm (1978) attempted to determine whether the combined use of PMR and systolic BP biofeedback was more effective than relaxation or biofeedback used alone. Their re-

sults indicated that with normotensive subjects the PMR and biofeed-
back combination provided greater control and larger reductions in BP
than either biofeedback or relaxation training alone. This finding pro-
vides additional experimental support for the treatment package de-
veloped by Patel.

A study recently reported by Frankel Patel, Hornitz, Friedewald, &
Gearder (1978) does not support the practical usefulness of a multifaceted
procedure for the treatment of hypertension. These researchers sequen-
tially employed the treatments of diastolic BP feedback, frontalis elec-
tromyograph feedback, and autogenic and relaxation training. Following
this phase of treatment, the procedures were then employed in combina-
tion. A second group received no treatment at all. After 16 weeks of
training, no group differences were obtained either within or between
treatment sessions, with both groups displaying only minimal BP reduc-
tions. Attempting to explain these results, these investigators
hypothesized that the treatment package was overly rigid and that the
sequential treatment presentation requires individualization.

Conflicting findings have also been reported when relaxation train-
ing and biofeedback techniques were compared to determine which
treatment is more effective in reducing elevated BP. Shoemaker and
Tasto (1975) reported that muscle relaxation training resulted in signifi-
cant in-session reductions in both systolic and diastolic BP. Significant
in-session reductions in diastolic BP were also achieved by the group
treated with BP biofeedback, but the absolute reductions were less dra-
matic than those of the relaxation group. No BP reductions across ses-
sions were obtained for the relaxation, the biofeedback, or the control
groups. However, the patients were not instructed to practice the relaxa-
tion procedure between laboratory visist, which probably reduced the
carry-over effects.

A recently reported study comparing biofeedback procedures and a
passive relaxation technique contributed additional discouraging findings
regarding the effectiveness of behavioral interventions in reducing ele-
vated BP (Surwit, Shapiro, & Good, 1978). Three behavioral intervention
strategies were compared in this study: (1) biofeedback for simultaneous
reductions in heart rate and systolic BP; (2) biofeedback for reductions in
forearm and frontalis electromyograph activity; and (3) a meditation pro-
cedure developed by Benson (1975). This study included no control group
to which these active treatments could be compared. No reductions in BP
were obtained either within sessions or between sessions for any of the
three treatment groups. As in the study conducted by Frankel *et al.*
(1978), the training program initiated by Surwit *et al.* (1978) lacked the
flexibility necessary to individualize the treatment program. The largest
reductions in BP were between the recordings obtained from previous
medical records and the baseline recordings obtained prior to treatment.
This finding reinforces the assessment issue raised by Beiman *et al.*
(1978b) and the need for BP recordings obtained in multiple settings.

Conclusions

The pharmacological treatment of essential hypertension has been demonstrated to reduce both the morbidity and mortality associated with the disease. This finding is especially true when diastolic BP levels are greater than 114 mmHg (Veterans Administration, 1967, 1970). Individual treatment procedures have been recommended when diastolic BP levels fall within the range of 90–104 mmHg (Report of the Joint National Commission, 1977). However, the undesirable side effects often produced by antihypertensive medications increase the difficulty encountered by physicians in establishing treatment compliance with their hypertensive patients. This compliance problem is the major obstacle facing the effective pharmacological treatment of essential hypertension.

Due to the poor generalization of BP reductions obtained through biofeedback training, it has been recommended that biofeedback procedures be utilized as adjuncts to facilitate the use of other relaxation methods (Schwartz & Shapiro, 1973). Significant reductions in BP have been obtained when either PMR or biofeedback-aided relaxation procedures were employed as adjunctive treatments to antihypertensive medications (Patel & North, 1975; Taylor et al., 1977). Additionally, relaxation procedures have been utilized successfully when employed specifically as alternatives to traditional medical treatments (Beiman et al., 1978a) and in other studies with unmedicated hypertensive patients (Benson et al., 1974a; Stone & DeLeo, 1976). However, recent investigations have contributed conflicting reports regarding the effectiveness of various behavioral treatments of hypertension (Frankel et al., 1978; Pollack et al., 1977; Surwit et al., 1978).

Behavioral treatments have been used successfully in treating elevated BP either as adjuncts or as alternatives to traditional medical treatments. However, it is premature to offer a conclusion regarding the most beneficial use of these procedures in the treatment of elevated BP. Behavioral procedures have only been actively applied to the treatment of essential hypertension for approximately 7 years, and the experimental findings still are not clear-cut.

Although behavioral procedures are reported to result in beneficial side effects, at least one problematic feature in their use as a treatment for hypertension has been noted. Taylor et al. (1977) reported that one of their patients, having been exposed to a behavioral treatment, refused to continue taking the prescribed antihypertensive medication. This is problematic not only because it increases the possible health risk to the patient but also because it points to the harm of employing procedures that might be viewed as competitive with the medical treatment rather than complementary. It has been suggested that the most valuable application of behavioral treatments might be in cases of resistant hypertension (Jacob et al., 1977). It is in these cases that the most noxious antihypertensive medications are normally used and when the most dramatic BP

reductions are reported following treatment with behavioral procedures. The single case noted by Taylor *et al.* (1977) simply reinforces the notion that when behavioral procedures are used in the treatment of hypertension, they need to be offered as being complementary to traditional medical approaches rather than in competition with them.

FUTURE DIRECTIONS

Although issues deserving further study have been mentioned throughout this chapter, there are some worthy of reiteration and others that remain to be made. For example, there is a great need to continue research examining the etiological basis of essential hypertension. Numerous research paradigms have been discussed that are used for this purpose, but perhaps the most effective means of investigating this issue is through the longitudinal study of large populations. To effectively conduct this type of research, multiple assessment measures are required. Therefore, attention must first be devoted to the development of additional assessment procedures. With increased understanding of the disease process itself, the detection and treatment of hypertension can only improve.

Recent findings from studies investigating the use of behavioral procedures in the treatment of essential hypertension have produced disappointing results (Frankel *et al.*, 1978; Surwit *et al.*, 1978). The researchers hypothesized that their treatment programs lost the important individualized approach due to the experimental rigor essential in large-group outcome studies. They suggested the use of individualized treatment programs, a notion supported by the positive findings reported by researchers employing single-case designs (Beiman *et al.*, 1978a; Brady *et al.*, 1974; Graham *et al.*, 1977). Single-case methodology offers individualized treatment designs and contributes to our knowledge of a treatment's effectiveness (Hersen & Barlow, 1976).

Numerous questions regarding the appropriate use of behavioral interventions in the treatment of elevated BP remain unanswered. Whether behavioral treatments should be used as adjuncts and/or alternatives to current medical practices is in need of clarification. The role of biofeedback procedures remains unclear, although research with normotensives suggests that biofeedback-aided relaxation is more effective than either biofeedback or relaxation used alone (Fey & Lindholm, 1978). Additionally, little work has been done to investigate the use of group, rather than individual, procedures in the treatment of hypertension. Individualized treatment programs offered in a group setting may provide an effective and efficient form of behavioral intervention. Thus far, researchers have focused their attention on biofeedback and relaxation procedures intended to decrease sympathetic arousal; however, the use of additional behavioral treatments may be warranted.

Cognitive-behavioral procedures (see Chapter 3) have been successfully employed in the treatment of a variety of anxiety-related disorders (Meichenbaum, 1977a). Although the relationship between cognitive mediation and physiological arousal is unclear, emotion-provoking self-statements have been reported to produce phasic increases in skin conductance (Russel & Brandsma, 1974), and self-statements designed to induce anxiety have produced tonic increases in heart rate (Orton, Beiman, LaPointe, & Lankford, 1980). Based on these findings, it might be fruitful to investigate the role of cognitive mediation in the development and/or maintenance of the sympathetic arousal associated with increased BP. Although cognitive-behavioral procedures have not been employed in the treatment of hypertension, they have been reported in the treatment of other psychophysiological disorders (Harrell & Beiman, 1978). Cognitive restructing techniques could provide an additional alternative or adjunctive behavioral intervention in the treatment of high BP.

Practitioners and researchers interested in behavioral medicine need not restrict their endeavors to the issues mentioned here. For example, numerous suggestions have been made to improve patient compliance to current pharmacological treatments. Patient education and a strong doctor–patient relationship are two variables that have been hypothesized to play a role in improved compliance (Caldwell *et al.*, 1970; Report of the Joint National Commission, 1977). However, research needs to be conducted to determine whether these variables are associated with the compliance problem and what can be done to manipulate them so the problem is reduced. Additionally, improved assessment methods might contribute to the identification of the noncompliant patient, which would facilitate early intervention to increase treatment compliance.

SUMMARY

Essential hypertension is estimated to account for 90% of the approximately 25 million cases of hypertension in this country. The asymptomatic nature of the early disease process creates problems for both the detection and treatment of hypertension. Current pharmacological treatments for high BP have been demonstrated to reduce effectively the morbidity and mortality associated with the disease, but they also produce unwanted side effects that contribute to poor treatment compliance among hypertensive patients.

Traditional medical assessment procedures include the routine recording of BP and a thorough medical workup. In addition to these procedures, behavioral assessment methods are being developed to facilitate the early detection and treatment of essential hypertension. Evidence is beginning to accumulate supporting the practice of obtaining BP recordings in multiple environmental settings rather than basing the diagnosis

of essential hypertension solely on recordings obtained in the medical setting. Although there is little empirical support for the existence of a "hypertensive personality," various client characteristics and environ- mental situations have been identified to be associated with increased BP. Improved assessment methods utilizing multiple measures in multiple settings are required to further elucidate the client characteristics as- sociated with high BP.

Behavioral procedures have been used in the treatment of essential hypertension in the hope of providing a safe and effective form of inter- vention. Biofeedback and relaxation procedures have both been demon- strated to lower elevated BP effectively. Although these procedures have been successfully employed both in combination with and as alternatives to pharmacological treatments, the most beneficial use of the behavioral interventions in the treatment of hypertension is not yet understood. The need for continued research designed to clarify the role of behavioral procedures in the treatment of essential hypertension is underscored by recent research findings indicating that behavioral interventions are not always effective in lowering elevated BP.

REFERENCES

Beary, J. F., Benson, H., & Klemchuk, H. P. A simple psychophysiologic technique which elicits the hypometabolic changes of the relaxation response. *Psychosomatic Medicine,* 1974, *36,* 115–120.

Beiman, I., Graham, L. E., & Ciminero, A. R. Self-control progressive relaxation training as an alternative nonpharmacological treatment for essential hypertension: Therapeutic effects in the natural environment. *Behaviour Research and Therapy,* 1978, *16,* 371– 375. (a)

Beiman, I., Graham, L. E., & Ciminero, A. R. Setting generality of blood pressure reductions and the psychological treatment of reactive hypertension. *Journal of Behavioral Medicine,* 1978, *1,* 445–453. (b)

Beiman, I., Israel, E., & Johnson, S. A. During training and posttraining effects of live and taped extended progressive relaxation, self-relaxation, and electromyogram biofeed- back. *Journal of Consulting and Clinical Psychology,* 1978, *46,* 314–321.

Benson, H. *The relaxation response.* New York: Avon Books, 1975.

Benson, H., Shapiro, D., Tursky, B., & Schwartz, G. Decreased systolic blood pressure through operant conditioning techniques in patients with essential hypertension. *Sci- ence,* 1971, *23,* 740–742.

Benson, H., Rosner, B. A., Marzetta, B. R., & Klemchuk, H. M. Decreased blood pressure in borderline hypertensive subjects who practiced meditation. *Journal of Chronic Disease,* 1974, *27,* 163–169. (a)

Benson, H., Rosner, B. A., Marzetta, B. R., & Klemchuk, H. M. Decreased blood pressure in pharmacologically treated hypertensive patients who regularly elicited the relaxation response. *Lancet,* 1974, *1,* 289–291. (b)

Bernstein, D. A., & Borkovec, T. D. *Progressive relaxation training: A manual for the helping professions.* Champaign, Ill.: Research Press, 1973.

Blackwell, B., Bloomfield, S., Gartside, P., Robinson, A., Hanenson, I., Magenheim, H., Nidich, S., & Zigler, R. Transcendental meditation in hypertension. Individual response patterns. *Lancet,* 1976, *1,* 223–226.

Blanchard, E. B., & Epstein, L. H. *A biofeedback primer.* Reading, Mass.: Addison-Wesley, 1978.

Blanchard, E. B., & Miller, S. T. Psychological treatment of cardiovascular disease. *Archives of General Psychiatry*, 1977, *34*, 1402–1413.

Blanchard, E. B., Young, L. D., & Haynes, M. R. A simple feedback system for the treatment of elevated blood pressure. *Behavior Therapy*, 1975, *6*, 241–245.

Brady, J. P., Luborsky, L., & Kron, R. E. Blood pressure reduction in patients with essential hypertension through metronome-conditioned relaxation: A preliminary report. *Behavior Therapy*, 1974, *5*, 203–209.

Brand, R. J., Rosenman, R. H., Sholtz, R. I., & Friedman, M. Multivariate prediction of coronary heart disease in the Western Collaborative Group Study, compared to the findings of the Framingham Study. *Circulation*, 1976, *53*, 348–355.

Brener, J., & Kleinman, R. A. Learned control of decreases in systolic blood pressure. *Nature*, 1970, *226*, 1063–1064.

Brod, J. Hemodynamic basis of acute pressor reactions and hypertension. *British Heart Journal*, 1963, *25*, 227–245.

Brod, J. The influence of higher nervous processes induced by psychosocial environment on the development of essential hypertension. In L. Levi (Ed.), *Society, stress, and disease* (Vol. 1). London: Oxford, 1971.

Burman, M. A., Pennebaker, J. W., & Glass, D. C. Time consciousness, achievement striving, and the type A coronary-prone behavior pattern. *Journal of Abnormal Psychology*, 1975, *84*, 76–79.

Caldwell, J. R., Cobb, S., Dowling, M. D., & Jough, D. The dropout problem in antihypertensive treatment. *Journal of Chronic Disease*, 1970, *22*, 579–592.

Carnahan, J. E., & Nugent, L. A. The effects of self-monitoring by patients on the control of hypertension. *American Journal of the Medical Sciences*, 1975, *269*, 69–73.

Ciminero, A. R., Nelson, R. O., & Lipinski, D. P. Self-monitoring procedures. In A. R. Ciminero, K. S. Calhoun, & H. E. Adams (Eds.), *Handbook of behavioral assessment.* New York: Wiley, 1977.

Conway, J. Labile hypertension: The problem. *Circulation Research*, 1970, *26–27*, Supplement 1, 43–47.

Dalske, H. F., & Wolf, G. L. A review of drugs used to control hypertension. In G. L. Wolf & R. S. Eliot (Eds.), *Practical management of hypertension.* Mount Kisco, N.Y.: Futura, 1975.

Dately, K. K., Dashmukh, S. N., Dalvi, C. P., & Vinekar S. L. "Shavesan": A yogic exercise in the management of hypertension. *Angiology*, 1969, *20*, 325–333.

Deabler, H. L., Fidel, E., Dillenkoffer, R. L., & Elder, S. T. The use of relaxation and hypnosis in lowering high blood pressure. *American Journal of Clinical Hypnosis*, 1973, *16*, 75–83.

Dembroski, T. N., MacDougall, J. M., Shields, J. L., Petitto, J., & Lushene, R. Components of the type A coronary-rpone behavior pattern and cardiovascular responses to psychomotor performance challenge. *Journal of Behavioral Medicine*, 1978, *1*, 159–176.

Dunn, M., & Freeman, J. Treatment of uncomplicated hypertension. In G. L. Wolf & R. S. Eliot (Eds.), *Practical management of hypertension.* Mount Kisco, N.Y.: Futura, 1975.

Elder, S. T., & Eustis, N. K. Instrumental blood pressure conditioning in outpatient hypertensives. *Behaviour Research and Therapy*, 1975, *13*, 185–188.

Elder, S. T., Ruiz, Z. R., Deabler, H. L., & Dillenkoffer, R. L. Instrumental conditioning of diastolic blood pressure in essential hypertensive patients. *Journal of Applied Behavior Analysis*, 1973, *6*, 377–382.

Fey, S. G., & Lindholm, E. Systolic blood pressure and heart rate changes during three sessions involving biofeedback and no feedback. *Psychophysiology*, 1975, *12*, 513–519.

Fey, S. G., & Lindholm, E. Biofeedback and progressive relaxation: Effects on systolic and diastolic blood pressure and heart rate. *Psychophysiology*, 1978, *15*, 239–247.

Frankel, B. L., Patel, D. J., Hornitz, D., Friedewald, W. T., & Gearder, K. R., Treatment of

hypertension with biofeedback and relaxation techniques. *Psychosomatic Medicine,* 1978, *40,* 276–293.

Frohlich, E. D., Kozul, V. J., Tarazi, R. C., & Dustan, H. P. Physiological comparison of labile and essential hypertension. *Circulation Research,* 1970, *26–27,* Supplement 1, 55–69.

Frumkin, K., Nathan, R. J., Prout, M. F., & Cohen, M. C. Nonpharmacologic control of essential hypertension in man: A critical review of the experimental literature. *Psychosomatic Medicine,* 1978, *40,* 294–320.

Goldfried, M. R., & Trier, C. S. Effectiveness of relaxation as an active coping skill. *Journal of Abnormal Psychology,* 1974, *83,* 348–355.

Goldman, H., Kleinman, K. M., Snow, M., Bidus, D. R., & Korel, B. Relationship between essential hypertension and cognitive functioning: Effects of biofeedback. *Psychophysiology,* 1975, *12,* 569–573.

Graham, C. E., Beiman, I., & Ciminero, A. R. The generality of the therapeutic effects of progressive relaxation training for essential hypertension. *Journal of Behavior Therapy and Experimental Psychiatry,* 1977, *8,* 161–164.

Gressel, G. E., Shobe, F. O., Saslow, G., Dubois, P. H., & Schroeder, H. A. Personality factors in arterial hypertension. *Journal of the American Medical Association,* 1949, *140,* 265–272.

Gutmann, M. C., & Benson, H. Interaction of environmental factors and systemic arterial blood pressure: A review. *Medicine,* 1971, *50,* 543–553.

Harrell, T., & Beiman, I. Cognitive-behavioral treatment of the irritable colon syndrome. *Cognitive Therapy and Research,* 1978, *2,* 371–375.

Harris, R. E., & Forsyth, R. P. Personality and emotional stress in essential hypertension in man. In G. K. Oresti & J. Meyer (Eds.), *Hypertension: Mechanisms and management.* New York: Grune & Stratton, 1973.

Hersen, M., & Barlow, D. H. *Single case experimental designs: Strategies for studying behavior change.* New York: Pergamon, 1976.

Jacob, R. G., Kraemer, H. C., & Agras, W. S. Relaxation therapy in the treatment of hypertension: A review. *Archives of General Psychiatry,* 1977, *34,* 1417–1427.

Jacobson, E. *You must relax.* New York: McGraw-Hill, 1934.

Jacobson, E. Variations of blood pressure with skeletal muscle tension and relaxation. *Annals of Internal Medicine,* 1939, *12,* 1194–1212.

Julius, S., Ellis, C. N., Pascuel, A. V., Matice, M., Hansson, L., Hunyor, S. N., & Sandler, L. E. Home blood pressure determination: Value in borderline (labile) hypertension. *Journal of the American Medical Association,* 1974, *229,* 663–666.

Kannel, W. B. Some lessons in cardiovascular epidemiology from Framingham. *American Journal of Cardiology,* 1976, *37,* 269–282.

Kannel, W. B., & Dawber, T. R. Hypertensive cardiovascular disease: The Framingham study. In G. K. Oresti & J. Meyer (Eds.), *Hypertension: Mechanisms and management.* New York: Grune & Stratton, 1973.

Kristt, D. A., & Engel, B. T. Learned control of blood pressure in patients with high blood pressure. *Circulation,* 1975, *51,* 370–378.

Lacey, J. I., & Lacey, B. C. Verification and extention of the principle of autonomic response-stereotype. *American Journal of Psychology,* 1958, *71,* 50–73.

Langfeld, S. B. Hypertension: Deficient care of the medically served. *Annals of Internal Medicine,* 1973, *78,* 19–33.

Manuck, S. B., Craft, S., & Gold, K. J. Coronary-prone behavior pattern and cardiovascular response. *Psychophysiology,* 1978, *15,* 403–411.

Meichenbaum, D. *Cognitive-behavior modification: An integrative approach.* New York: Plenum, 1977. (a)

Meichenbaum, D. Cognitive factors in biofeedback therapy. In J. Kamiya, T. X. Barber, N. E. Miller, D. Shapiro, & J. Stoyva (Eds.), *Biofeedback and self-control.* Chicago: Aldine, 1977. (b)

Obrist, P. A. The cardiovascular-behavioral interaction: As it appears today. *Psychophysiology,* 1976, *13,* 95–107.

Obrist, P. A., Lawler, J. E., Howard, J. L., Smithson, K. W., Martin, P. L., & Manning, J. Sympathetic influences on cardiac rate and contractility during acute stress in humans. *Psychophysiology*, 1974, *11*, 405–426.

Orton, I. K., Beiman, I., LaPointe, K., & Lankford, A. *Induced states of anxiety and depression: Effects on self-reported affect and tonic psychophysiological response.* Manuscript submitted for publication, 1980.

Patel, C. H. Yoga and biofeedback in the management of hypertension. *Journal of Psychosomatic Research*, 1975, *19*, 355–360.

Patel, C. H. Biofeedback-aided relaxation and meditation in the management of hypertension. *Biofeedback and Self-Regulation*, 1977, *2*, 1–41.

Patel, C. H., & North, W. R. S. Randomized controlled trial of yoga and biofeedback in the management of hypertension. *Lancet*, 1975, *2*, 93–95.

Paul, G. L. Behavioral modification research: Design and tactics. In C. M. Franks (Ed.), *Behavior therapy: Appraisal and status.* New York: McGraw-Hill, 1969. (a)

Paul, G. L. Physiological effects of relaxation training and hypnotic suggestion. *Journal of Abnormal Psychology*, 1969, *74*, 425–437. (b)

Pollack, A. A., Weber, M. A., Case, D. B., & Laragh, J. H. Limitations of transcendental meditation in the treatment of essential hypertension. *Lancet*, 1977, *1*, 71–73.

Report of the joint national committee on detection, evaluation, and treatment of high blood pressure: A cooperative study. *Journal of the American Medical Association*, 1977, *237*, 255–261.

Rosenman, R. H., Friedman, M., Straus, R., Wurm, M., Kositchek, R., Haan, W., & Werthessen, N. T. A predictive study of coronary heart disease: The Western Collaborative Group Study. Journal of the American Medical Association, 1964, *189*, 15–26.

Russel, P. L., & Brandsma, J. M. A theoretical and empirical integration of the rational-emotive and classical conditioning theories. *Journal of Consulting and Clinical Psychology*, 1974, *42*, 389–397.

Schachter, J. Pain, fear, and anger in hypertensives and normotensives: A psychophysiological study. *Psychosomatic Medicine*, 1957, *29*, 17–29.

Scherwitz, L., Berton, K., & Leventhal, H. Type A assessment and interaction in the behavior pattern interview. *Psychosomatic Medicine*, 1977, *39*, 229–240.

Schucker, B., & Jacobs, D. R. Assessment of behavioral risk for coronary disease by voice characteristics. *Psychosomatic Medicine*, 1977, *39*, 219–228.

Schwartz, G. E., & Shapiro, D. Biofeedback and essential hypertension: Current findings and theoretical concerns. *Seminars in Psychiatry*, 1973, *5*, 493–503.

Shannon, B. J., Goldman, M. S., & Lee, R. M. Biofeedback training of blood pressure: A comparison of three feedback techniques. *Psychophysiology* 1978, *15*, 53–59.

Shapiro, A. P., Schwartz, G. E. Ferguson, D. C. E., Redmond, D. P., & Weiss, S. M. Behavioral methods in the treatment of hypertension: A review of their clinical status. *Annals of Internal Medicine*, 1977, *86*, 626–636.

Shapiro, D., Schwartz, G. E., & Tursky, B. Control of diastolic blood pressure in man by feedback and reinforcement. *Psychophysiology*, 1972, *9*, 296–304.

Shoemaker, J. E., & Tasto, D. L. The effects of muscle relaxation on the blood pressure of essential hypertensives. *Behavior Research and Therapy*, 1975, *13*, 29–43.

Sokolow, M., Werdeger, D., Perloff, D. B., Cowan, R. M., & Brenenstuhl, H. Preliminary studies relating portably recorded blood pressure to daily life events in patients with essential hypertension. In M. Koster, H. Musoph, & P. Visser (Eds.), *Psychosomatics in essential hypertension.* New York: Karger, 1970.

Stone, R. A., & DeLeo, J. Psychotherapeutic control of hypertension. *New England Journal of Medicine*, 1976, *294*, 80–84.

Suinn, R. M., & Bloom, L. J. Anxiety management training for pattern A behavior. *Journal of Behavioral Medicine*, 1978, *1*, 25–35.

Surwit, R. S., Shapiro, D., & Good, M. I. Comparison of cardiovascular biofeedback, neuromuscular biofeedback, and meditation in the treatment of borderline essential hypertension. *Journal of Consulting and Clinical Psychology*, 1978, *46*, 252–263.

Taylor, C. B., Farquhar, J. W., Nelson, E., & Agras, S. Relaxation therapy and high blood pressure. *Archives of General Psychiatry*, 1977, *34*, 339–342.

Thoreson, C. E., & Mahoney, M. J. *Behavioral self-control*. New York: Holt, Rinehart & Winston, 1974.

Tursky, B., Shapiro, D., & Schwartz, G. E. Automated constant cuff pressure system to measure average systolic and diastolic blood pressure in man. *IEEE Transactions on Biomedical Engineering*, 1972, *19*, 271–276.

Veterans Administration Cooperative Group Study on Antihypertensive Agents. Effects of treatment or morbidity in hypertension. Results in patients with diastolic blood pressure averaging 115 through 129 mmHg. *Journal of the American Medical Association*, 1967, *202*, 1028–1034.

Veterans Administration Cooperative Gruop Study on Antihypertensive Agents. Effects of treatment on morbidity in hypertension II. Research in patients with diastolic blood pressure averaging 90 through 114 mmHg. *Journal of the American Medical Association*, 1970, *213*, 1143–1152.

Wallace, R. K., Benson, H., & Wilson, A. F. A wakeful hypometabolic physiologic state. *American Journal of Physiology*, 1971, *221*, 795–799.

Weiner, H. *Psychobiology and human illness*. New York: Elsevier North-Holland, 1977.

Wolf, S., & Wolf, H. G. A summary of experimental evidence relating life stress to the pathogenesis of essential hypertension in man. In E. T. Bell (Ed.), *Hypertension: A symposium*. Minneapolis: University of Minnesota Press, 1951.

Wolpe, J., & Lazarus, P. A. *Behavior therapy techniques*. New York: Pergamon, 1968.

World Health Organization. Arterial hypertension and ischaemic heart disease: Preventive aspects. *Technical Report Series*, 1962, *231*, 4–7.

Chronic Headache

Etiology and Management

MICHAEL FEUERSTEIN AND JOHN GAINER

INTRODUCTION

Although not a life-threatening disorder, chronic headache in its severe forms is associated with a number of adverse physiological, psychological, and social consequences. Chronic headache has been estimated to affect 10–30% of the population and therefore exerts a considerable impact on society.

Recent reports indicate that the cerebral ischemia associated with the prodromal phase of migraine can be equivalent to that observed in occlusive cerebrovascular disease (Mathew, Hrastnik, & Meyer, 1976; Welch, Chabi, Nell, Bartosh, Meyer, & Mathew, 1978) and in certain cases can be sufficient to result in cerebral tissue damage. The pharmacological agents used in the management of chronic headache also exert their toll on the individual. Medication is the most common treatment for both migraine and muscle contraction headache (MCH) and is prescribed to an estimated 90% of those who seek professional help (Rachman & Philips, 1975; Turner & Stone, 1979). Iatrogenic effects of drug therapy for headache can include dependency (Medina & Diamond, 1977) and a variety of physical symptoms ranging from gastrointestinal problems to circulatory disturbances. In addition, an estimated 50% of headache cases are not under the care of a physician (Waters & O'Connor,

MICHAEL FEUERSTEIN • Department of Psychology, McGill University, Behavioral Medicine Service, Allen Memorial Institute, Montreal, Quebec, Canada H3A 1B1.   JOHN GAINER • Department of Psychology, McGill University, Montreal, Quebec, Canada H3A 1B1.

1971). It is likely that most of these individuals are self-medicating with various over-the-counter analgesics that are safe with moderate use; as their use becomes chronic, however, a serious health risk can exist.

The social and economic costs of chronic headache also attest to the serious nature of these disorders. An early investigation by Lindhardt (1960) indicated that approximately 10% of a series of 550 cases had missed between 123 and 164 days of work due to headache. Clarke and Waters (1974) observed that 8% of a general-practice population was absent from work for a total of 191 days during the year due to headache. Philips (1977a) reported that 15% of women with severe headache (vascular and muscle contraction) listed taking time off from work as a strategy for dealing with headache. In a more comprehensive analysis, Nikiforow and Hokkanen (1979) observed that of 2,000 headache subjects from the general population, 26% reported easing their pace of work in order to manage their attacks and 47% were at times forced to lie down. This latter finding suggests that the impact of headache is reflected in more than just the number of days of work missed. If one includes reduced efficiency at work and the potential impact on family life, individual and social losses are perhaps more accurately reflected.

Despite the significance of chronic headache and the substantial literature dealing with its etiology (see Bakal, 1975; Dalessio, 1972; Lance, 1978) and behavioral treatment (see Adams, Feuerstein, & Fowler, 1980; Jessup, Neufeld, & Merskey, 1979), there has been no integrative review of both etiology and management from a biobehavioral perspective. The present chapter fills such a gap. Particular emphasis is placed on research with direct implications for the current biobehavioral management of headache.

HEADACHE TYPES AND CLINICAL CHARACTERISTICS

Based on early epidemiological and clinical research, the Ad Hoc Committee on Classification of Headache (1962) differentiated 15 types of headache. Although it is now recognized that psychological factors can play a considerable role in any type of persistent pain problem (Melzack, 1973; Sternbach, 1978; Weisenberg, 1977), and can therefore influence each kind of headache, there are three major headache types to which psychological factors appear to contribute: vascular headache of the migraine type; muscle contraction headache; and a combination of these two referred to as the mixed or combined headache. The present chapter will focus on these three headache variants.

Although recent findings suggest that the hypothesized pain mechanisms forming the basis for the early classification of headache are not well substantiated (Bakal, 1980; Philips, 1978), it is important that, due to the absence of adequate alternatives, the reader be familiar with

the traditional classification of headaches and the characteristics generally associated with the major headache types.

Migraine Headache

The Ad Hoc Committee on Classification of Headache (1962) defined migraine as

> recurrent attacks of headache, widely varied in intensity, frequency and duration. The attacks are commonly unilateral in onset; are usually associated with anorexia and, sometimes, with nausea and vomiting; some are preceded by, or associated with conspicuous sensory, motor, and mood disturbances; and are often familial. (p. 378)

Selby and Lance (1960) have reported considerable data pertaining to the clinical presentation of migraine. In regard to age of onset, these authors found that 21% of 496 cases reported the onset of symptoms before the age of 10 years; 92% experienced symptoms before the age of 40. The range of onset was from 18 months to 60 years. More than 50% of patients reported 1–4 episodes of migraine per month, persisting less than 24 hours in approximately 66% of cases. Waters and O'Connor (1971) reported that 16% of nonmigraine and 40% of migraine patients indicated headaches lasted more than 8 hours. The 15% of patients who reported more than 10 attacks per month in Selby and Lance (1960) also reported muscle contraction headaches and were often unable to differentiate between the two. A total of 38% of these patients experienced unilateral pain, with 20.7% reporting headaches consistently on the same side and 17.4% reporting headaches on either side. An equal number (38.2%) experienced holocrania, 22.6% were mixed, and 1.2% reported migraine equivalents (i.e., headache was not a symptom). The majority reported nausea (87%), photophobia (82%), and dizziness (72%), whereas vomiting (56%), visual disturbances (41%), vertigo (33%), and blackout (18.5%) were somewhat less common. Lance and Anthony (1966) observed a slightly higher incidence of hemicrania (68%) with approximately the same incidence of nausea and vomiting. These authors also observed focal neurological symptoms (e.g., urinary frequency, fortification spectra, aphasia, etc.) in 65% of their sample of 500 cases.

A more recent report by Olesen (1978), in which 750 cases were studied, indicated that unilateral pain was experienced in 56% of the patients and bilateral pain in 44%. In 47% the pain quality was pulsating, in 42% it was of a pressing nature, and in 11% it was of "another type" (not specified). The severity of pain appears to be related to the presence of sensory warning signs (Waters, 1971; Waters & O'Connor, 1971), unilaterality, and nausea (Waters & O'Connor, 1971). In Olesen's (1978) sample, the patients with severe pain described it significantly more often as pulsating.

The most common prodromal signs in migraine include scotomata,

hemianopia, unilateral paresthesia, and speech disorder. Other accompaniments include abdominal distension, cold cyanosed extremities, vertigo, tremors, pallor, dryness of the mouth, excessive sweating, chilliness, anorexia, and disturbances in water metabolism as evidenced by edematous skin and urinary frequency with pale urine of low specific gravity (Dalessio, 1972).

Muscle Contraction Headache (MCH)

The Ad Hoc Committee on Classification of Headache (1962) defined muscle contraction headache as

> an ache or sensation of tightness, pressure or constriction; widely varied in intensity, frequency and duration; sometimes long-lasting, commonly occipital; and associated with sustained muscle contraction in the absence of permanent structural change, usually as part of the individual's reaction during life stress. (p. 379)

Data obtained from 1,420 cases of MCH (Friedman, 1979) indicate that the more common characteristics of MCH involve a moderate to variably severe, nonthrobbing headache that is most often bilaterally localized in the occipital, frontal or occipital and suboccipital regions. The average frequency is in excess of five headaches per month. The average duration is 4 hours, with half the patients experiencing more than 7 hours of headache. Associated symptoms include fatigue, anxiety, tension, dizziness, and "bright spots in front of the eyes." Prodromata, nausea, and vomiting are generally absent. Pain onset is typically gradual, and there is a preponderance of female cases (78%). Questionnaire and interview data suggest that in the majority of cases (77%) the headaches were attributed to "emotional" or "situational factors."

PREVALENCE

As briefly mentioned previously, headache is a common disorder. The National Ambulatory Medical Care Survey (DeLozier & Gagnon, 1975) listed headache as the 14th most common symptom, accounting for more than 12 million office visits in the United States during the survey year. Headache was considered to constitute a "serious" or "very serious" problem for approximately 20% of the cases. In one general-practice study, headache was found to be the ninth most common symptom (Morrell, 1972). Philips (1977a) reported questionnaire data from general-practice patients in which 74.3% of males and 88.6% of females reported experiencing headache in the 6 months preceding the study.

Nikoforow and Hokkanen (1978) distributed a headache questionnaire to each inhabitant over 15 years of age in defined urban and rural areas of northern Finland. These authors reported that the prevalence of

headache was 73% in women and 58% in men. In addition to this sex difference, there was also a higher incidence in urban areas and a sharp decline in incidence in those over 65. Of the 1,348 individuals reporting severe headaches, 63% were female and 37% were male. Of the women, 69% had severe headaches once a month or more, with 15% reporting them once a week or more. For men 34% had approximately one severe headache per month, and 16% had severe headaches once per week or more frequently. With few exceptions (Ziegler, Hassanein, & Hassanein, 1972), most studies support the finding of a higher incidence (Selby & Lance, 1960; Waters, 1971) and greater reported severity (Turner & Stone, 1979) among women. The decline of symptomatology with age appears to be a common finding as well.

Investigations of the incidence of migraine headache in the general population have reported varied results. Estimates range from less than 8% (Brewis, Poskanzer, Rolland, & Miller, 1966; Childs & Sweetnam, 1961; Ogden, 1952; Walker, 1959) to more than 25% (Waters & O'Connor, 1975). These conflicting reports can be accounted for by a number of factors. Foremost is the problem of diagnostic criteria, although imprecision in measurement, patients not contacting their physicians, poor response rates, and cross-cultural differences might all contribute to this variability. Acknowledging these difficulties, Waters and O'Connor (1975) reported data from three separate epidemiological surveys involving a total of 1,977 men and 2,237 women. These data revealed the incidence of migraine to be between 23 and 29% in women and 15 and 20% in men. In the same year Markush, Karp, Heyman, and O'Fallon (1975) reported a similar incidence of migraine (23%) in a sample of 15- to 44-year-old women.

Philips (1977a) reports that approximately 80% of persons with headache suffer from tension headache. A total of 170 males and 326 females were grouped into four diagnostic categories (classic migraine, migraine, muscle contraction, and mixed) based on descriptions of their symptoms on a headache questionnaire. The results indicated that for the females 3% had classic migraine, 18% common migraine, 77% muscle contraction, and 3% mixed headache. For the males 0.6% had classic migraine, 12% migraine, 87% muscle contraction, and 0.6% were mixed. Although Philips was clear in stating her diagnostic criteria, a neurological assessment of a subsample of her respondents, as in the Nikiforow and Hokkanen (1978) study, would have added considerably to her results. Unlike Philips (1977a), who reports no significant sex difference, Lance (1978) states that approximately 75% of patients with tension headache were female.

Headache is also a common symptom in pediatric practice, and a number of investigations into its incidence have been reported. Vahlquist (1955) found a 5% incidence of migraine and a 13% incidence of nonmigraine headache in a sample of 1,236 children between the ages of 10 and 11 years. A study by Bille (1962) investigated the incidence of headache in

children between the ages of 7 and 15. These findings indicated that, by age 7, 2.5% of the children had frequent nonmigraine headache, 1.4% had migraine, and 35% had infrequent nonmigraine headache. By age 15, 15.7% reported frequent nonmigraine headache, 5.3% migraine, and 54% infrequent nonmigraine headache. Sillanpää (1976) examined 4,235 7-year-old school children and reported that 37.7% of this sample had headaches before starting school. In 6.3% of the children, headaches were recurrent, and 3.2% had migraine symptoms.

Although a good deal of effort has gone into epidemiological investigations of headache, our understanding of the naturally occurring relationships among parameters that define the headache (e.g., duration, severity, frequency) and those of a secondary nature (e.g., medication intake, occupational behavior, other physical, environmental, and psychological variables) remains limited.

ETIOLOGICAL CONSIDERATIONS

In any discussion of etiology it is useful to delineate those factors that predispose the individual to headache from those that exacerbate and maintain it. It is possible that these factors are quite different, and specification of predisposing, exacerbating, and maintaining factors helps to clarify the uncertainty that often prevails when considering the etiological aspects of a disorder.

Predispositional Factors

At the predisposition level, it has often been argued that some genetic deficit exists in persons with migraine that either is associated with a peripheral cephalic vasomotor dysfunction in the temporal arteries (Dalessio, 1972) or is a more central deficit in neurotransmission (Sicuteri, 1978). It is this heightened vulnerability in conjunction with an overload of psychosocial stress, various food substances, hormonal change, and/or weather change that has been suggested as initiating the migraine headache. The evidence in support of a genetic component is only suggestive at best. In several reports involving large numbers of patients and controls, the percentage of migraine cases reporting positive family history range from 10 to 71% (Bassoe, 1933; Childs & Sweetnam, 1961; Ely, 1930; Lennox, 1947; Selby & Lance, 1960; Waters, 1971), with only one series reporting as much as 71%. In a rare study in which information regarding headache status was obtained directly from interviews with family members rather than indirectly from the patient, familial incidence for migraine was only 10% in the headache group and 5.5% in matched nonheadache controls (Waters, 1971).

The twin study approach has also been used to address the issue of genetic predisposition. Ebbing (1956) reported 30% concordance in 3

monozygotic and 10 dizygotic pairs. Harvald and Hauge (1956) reported 33% concordance among 18 monozygotic pairs and 5.5% for dizygotic pairs. Recently, Ziegler, Hassanein, Harris, and Stewart (1975) reported data on 106 twin pairs. Following a careful analysis using blood grouping, height, weight, and appearance, 65 pairs were judged as dizygotic and 51 as monozygotic. Of the monozygotic pairs, two were concordant (4.9%). A similar rate was found in dizygotic pairs (3.1%). In conjunction with the data reported by Waters (1971), these findings call into question the contribution of genetic factors in headache. For a more detailed review of the genetic aspects of migraine, the reader is referred to Refsum (1968) and Ziegler (1978).

In regard to the contribution of psychosocial stress in the predisposition to migraine, Henryk-Gutt and Rees (1973) indicated that approximately 50% of their subjects reported that migraines first began during a stressful period in their lives. Unfortunately, this is the only study known to the authors that has reported data on the potential predispositional role of psychosocial stress in migraine. The majority of studies emphasize the contribution of stress in the exacerbation of headache (i.e., trigger factor).

Exacerbating Factors

It is not uncommon for headache patients, particularly migraine patients, to provide clinicians with lists of factors that they are convinced are associated with an increase in frequency, duration, or severity of their headaches. Although there has been relatively little research attempting to isolate these factors and identify their relative influence on specific headache characteristics, a number of factors are commonly assumed to exacerbate migraine. These include diet, weather, sleep, hormonal changes, psychosocial stress, and various medical disorders. Psychosocial stress has been assumed to be the major exacerbating factor in MCH, though not in migraine.

Diet

Selby and Lance (1960) reported that approximately one of every four migraine patients attributes the onset of headache to the ingestion of particular foods. Especially common in terms of these reports are foods containing the vasoactive amines, tyramine and phenylethylamine (e.g., chocolate, ripe cheeses, pickled herring, chicken livers, canned figs, pods of broad beans). A number of studies suggest that the precise role of these substances in the genesis of migraine is unclear. Shaw, Johnson, and Keogh (1978) administered 200 mg of tyramine hydrochloride to nine patients reporting symptoms of classic migraine and attacks precipitated by ingestion of cheese. None of the patients reported a headache in the 48 hours following drug ingestion. Two of six patients who received a placebo reported a typical migraine headache that developed after 3

hours. These results sharply contrast with those of Harrington, Horn, and Wilkinson (1970), who reported a response to tyramine (125 mg) and virtually no placebo response. Moffett, Swash, and Scott (1972), in a double-blind study, found no difference between tyramine and lactose in the provocation of headache.

The status of phenylethylamine is similar. In a double-blind investigation of 36 "chocolate-sensitive" subjects, 50% developed headaches after ingesting phenylethylamine, and 16% experienced headache after lactose (Sandler, Youdim, & Hanington, 1974). In a second double-blind study, Moffett, Swash, and Scott (1974) compared chocolate ingestion with the effects of a placebo that contained no cocoa. Additives were used to conceal both the texture and taste of the actual chocolate. Of 25 chocolate-sensitive migraine sufferers, 8 (32%) responded with a headache to chocolate, 5 (20%) to placebo, 1 (4%) to both, and 11 (44%) to neither.

In a recent investigation, Medina and Diamond (1978) compared three diets in a group of 24 patients. Diet A contained items high in tyramine or other vasoactive substances (e.g., phenylethylamine, nitrite) and suggested avoidance of tyramine-free foods; diet B contained items free of these vasoactive substances and suggested avoidance of foods containing them. Diet C did not limit ingestion of food. Subjects were randomly assigned to their first diet and once this was completed would adopt the other two in sequence. The data indicated that the intake of foods containing relatively high concentrations of tyramine, phenylethylamine, dopamine, or nitrites was not related to increase in the frequency of migraine attacks.

Whether the headaches that do occur are a reaction to the specific chemical contents of these foods or whether they are adventitiously conditioned responses is unclear (Jessup, 1978). A number of other dietary factors implicated in vascular headache include monosodium glutamate (the Chinese restaurant syndrome), transient and reactive hypoglycemia, sodium nitrite (contained in most cured meats to maintain red coloring), and alcohol (a centrally acting nonspecific vasodilator). Although additional double-blind procedures are required to evaluate the effects of these substances on migraine, it appears that specific dietary agents play only a minimal role in the etiology of migraine. In regard to MCH, diet appears to play no role in its genesis.

Weather

Adverse weather conditions, particularly hot dry winds, have been associated with muscle contraction-like headaches, irritability, discomfort, and migraine. Sulman, Levy, Lewy, Pfeifer, Superstine, and Tal (1974) reported that 20–30% of a population exposed to the sudden hot dry winds known as the Sharav in Israel experienced attacks of migraine. In a recent study of a heterogeneous group of headache patients (migraine, MCH, or

migrainous neuralgia—total $N = 310$), Wilkinson and Woodrow (1979) evaluated the relationships of a number of weather conditions (wind direction and velocity, barometric pressure, humidity, and temperature) existing prior to, during, and following the onset of headache. These investigators observed no significant relationships between headache onset and adverse weather conditions, although a consistent time of onset was apparent from these data (6:00 A.M.–9:00 A.M.). The inconsistency with the Sulman et al., (1974) study was attributed to the absence of any sudden change in weather conditions in England, which is not the case in the Sharav. A second explanation for the lack of a significant relationship might be the use of a heterogeneous group of headache cases in the Wilkinson and Woodrow (1979) study. It is possible that different covariations of weather and headache exist for various types of headaches. Considering recent psychophysiological findings indicating a relationship between weather conditions (relative humidity) and physiological reactivity in nonclinical subjects (Waters, Koresko, Rossie, & Hackley, 1979), the potential role of meteorological factors in headache warrants further investigation.

Sleep

As indicated above, a substantial number of migraine patients report awakening in the morning with a fully developed headache. A relationship between migraine onset, rapid eye movement (REM) sleep, plasma serotonin levels (Dexter & Riley, 1975) and plasma catecholamine levels (Hsu, Crisp, Kalucy, Koval, Chen, Carruthers, & Zilkha, 1977) have been reported that can help explain this clinical observation. Specifically, 3 hours prior to awakening with migraine, plasma noradrenaline levels rise, whereas at the onset of REM plasma serotonin falls. Dexter and Riley (1975) and Hsu et al. (1977) reported that migraine onset was closely associated with REM, suggesting that the changes in noradrenaline and serotonin preceding or concomitant with REM may trigger the vasomotor pattern typically associated with migraine. The effects of some pharmacological agents used to treat migraine (e.g., tricyclic antidepressants, barbiturates, caffeine, and amphetamines) on REM sleep provide further support for the REM–migraine association. These drugs depress REM sleep without increasing stages III and IV slow-wave sleep.

A crucial question regarding nocturnal migraine is what factor or set of factors influence REM production in patients with migraine in order to set the occasion for biochemical and vasomotor changes during sleep. Of particular interest is the potential role exposure to stress during the day may exert on these nocturnal changes. Given the importance of sleep in the etiology of migraine, investigations of the effects of stress on REM sleep in migraine patients and concomitant temporal artery and other autonomic changes during sleep could provide potentially useful information regarding this inadequately understood aspect of migraine.

Hormonal Fluctuations

Between 60% (Lance, 1978) and 70% (Diamond & Dalessio, 1978) of women who suffer from migraine report attacks occurring just before, during, or immediately following menses. Most migraine sufferers experience symptom relief during pregnancy, particularly if migraine was previously associated with menses (Lance & Anthony, 1966). Oral contraceptives appear to aggravate the migraine condition (Carroll, 1971; Dalton, 1976; Whitty, Hockaday, & Whitty, 1966), and the majority of women who discontinue contraceptive medication experience a reduction in migraine frequency (Kudrow, 1975). For a more complete review of the role of hormonal factors in migraine, the reader is referred to Kudrow (1975, 1976).

Stress

Psychosocial stress has often been implicated as a precipitating factor in both muscle contraction and migraine headaches. However, the evidence linking stress to headache is only suggestive. Early observational studies conducted in the 1950s by Wolff and colleagues (Dalessio, 1972) indicated that headaches could be triggered by discussing personally relevant stressful material with migraine patients. More recently, Selby and Lance (1960) reported that 67% of a group of 388 patients with migraine indicated "emotions" as initiating the onset of unilateral headaches. In a somewhat more detailed analysis, Henryk-Gutt and Rees (1973) requested 100 migraine cases to monitor headache activity along with any triggering factors for a 2-month period. These authors found that although migraine sufferers did not differ from a matched nonheadache control group in terms of reported daily exposure to emotional stress, stress was reported as a precipitating factor in 54% of headache attacks. In a recent epidemiological analysis of headache, Nikiforow and Hokkanen (1978) reported that the most common trigger for headache (type unspecified) was stress, with 46% of the women and 35% of men indicating this factor as responsible for headache.

Although the face validity of stress as a trigger factor is high, one must be cautious from the evidence cited above due to the potential lack of validity and reliability of self-report and the problems inherent in observational and large-scale epidemiological studies.

Associated Illness

Although several physical disorders have been associated anecdotally with chronic headache, particularly migraine, no consistent relationships have emerged. Selby and Lance (1960), Henryk-Gutt and Rees (1973) and Waters (1971) all indicate the absence of significant elevations in blood pressure in subjects with migraine. Visual disturbances (e.g., visual acuity

deficits or ocular muscle palsy) have also been ruled out as important in the development of vascular headache (Waters, 1971). Electroencephalo-gram abnormalities (Selby & Lance, 1960), epilepsy (Lance & Anthony, 1966), and allergy (Lance & Anthony, 1966; Medina & Diamond, 1976; Selby & Lance, 1960) have also been investigated with no clear evidence emerging to support differential incidence in migraine, muscle contrac-tion headache, and nonheadache controls (see Adams et al., 1980). One of the few consistent findings is a relationship between migraine and re-ported childhood vomiting and biliousness (Lance, 1978), an indirect index of an autonomic nervous system dysfunction. There is no evidence of a higher incidence of allergic disorders, childhood vomiting attacks, or other physical disorders among MCH cases when compared to nonheadache controls.

Maintaining Factors

Much less emphasis has been placed on the identification of factors that maintain chronic headache. It is a plausible hypothesis that certain exacerbating factors may also operate to maintain the headache. For example, recurrent exposure to stressful environments might act as a maintaining factor, and cyclic variations in hormonal levels might insure the maintenance of migraine for some women. At the behavioral level, as with other disorders, a number of social learning factors can prolong the occurrence of both migraine and MCH in certain cases (Fordyce, 1976; Wooley, Blackwell, & Winget, 1978). Preliminary evidence suggests that certain pain behaviors (e.g., verbal pain complaints, inactivity, frequent medication use) might be maintained through interaction of the patient with his or her environment. Specifically, attention (secondary gain) for symptoms, the pleasant subjective experience often accompanying cer-tain pain medication, or use of the symptom to avoid unpleasant en-vironmental demands are factors that can increase the probability of sub-sequent pain, thus maintaining the problem. Support for the potential role of these factors has primarily been reported in the context of the more traditional chronic-pain problems (Fordyce, 1976) rather than recur-rent or intermittent pain such as headache. However, the research indic-ating the presence of MCH headache in the absence of heightened skeletal muscle activity provides indirect support for the possible exis-tence of such alternative behavioral contributions (Philips, 1977b, 1978). The authors are unaware of any social learning analysis of pain behavior associated with migraine. This type of analysis might prove quite useful in enhancing our understanding of the maintaining factors in migraine.

It is unlikely that a single etiological factor can account for the majority of variance in migraine or MCH. Etiological research in this area is characterized by the use of clinical observation, retrospective analyses, and case control studies. Although these approaches are critical in the early stages of etiological investigation, if our understanding of risk fac-

tors is to advance to the point of identifying the relative risk ratios of these factors, prospective matched-cohort studies must be conducted. Although it is recognized that the end points of certain cardiovascular disorders can be more objectively delineated than headache, the research on hypertension (Stamler, Berkson, Dyer, Lepper, Lindberg, Oglesby, McKean, Rhomberg, Schoenberger, Shekelle, & Stamler, 1975) and coronary heart disease (Keys, Aravanis, Blackburn, van Buchem, Buzina, Djordjevic, Fidanza, Karvonen, Menotti, Puddu, & Taylor, 1972) could provide useful models for etiological research on headache.

MECHANISMS

Physiological and Biochemical Mechanisms

Although etiologic factors remain elusive, a model of the pathophysiology of headache has emerged that is both heuristic and clinically useful. The precise influence of the intra- and extracranial arteries on migraine have not been completely delineated, however, both carotid branches are involved in the pathophysiology of migraine (Lance, 1978). There is also considerable agreement that migraine involves a basic two-stage vasular process: vasoconstriction followed by vasodilation. Specifically, some as yet unspecified combination of factors (e.g., chemical, mechanical, or neurogenic) produces intracranial arteriolar narrowing. This initiates the decrease in cerebral blood flow (CBF) that ultimately leads to brain ischemia. The aura is believed to be a result of this ischemia. An accumulation of CO_2 follows, resulting in arteriolar dilation and increased CBF. The extracranial activity also begins with arteriolar narrowing, resulting in a decreased cutaneous flow, arteriovenous (AV) shunting, and subsequent ischemia. The release of pain threshold–lowering substances (e.g., neurokinins) precedes the rebound arterial distension and headache. The actual headache pain covaries with the dilation of the extracranial arteries (Edmeads, 1979).

The earliest studies isolating and describing the two-stage process were those of Wolff and his colleagues (Dalessio, 1972). In a single case, Schumacher and Wolff (1941) investigated the effect of the vasodilator amyl nitrite on the prodromal scotomata. In doses insufficient to lower blood pressure, the inhalation of amyl nitrite resulted in elimination of the visual defects. A higher dose, however, with its accompanying decline in blood pressure, led to a marked exacerbation of the preheadache symptoms. These early observations were consistent with the initial vasoconstrictive phase.

Graham and Wolff (1938) first demonstrated the vasodilation phase by recording pulsations of the extracranial temporal and/or occipital artery on the afflicted side during headache. They observed a vasodilation associated with the onset of head pain and noted that injections of er-

gotamine tartrate, known to affect smooth muscles and to lead to fairly abrupt termination of migraine attacks, produced an average reduction of 50% in the amplitude of pulsations in the recorded arteries. It was also found that the reported intensity of the headache tended to covary with the amplitude of pulsations. More recent studies on the hemodynamics of migraine implement a ^{133}Xe injection technique that permits the quantification of regional cerebral blood flow (rCBF). This technique also permits quantitative analysis of extracranial flow. Employing a modification of the ^{133}Xe injection procedure, Skinhøj and Paulson (1969) studied a migraine patient undergoing arteriographic examination. The patient was asymptomatic at the time of carotid puncture and during the initial rCBF measurements. He then developed prodromal symptoms (e.g., tactile disturbance in the right hand, agnosia, etc.). At this time, rCBF measurements revealed significant flow reduction in the entire internal carotid system. During a headache attack in a second patient, these authors found the reverse to be true; flow values in the entire internal carotid system were significantly elevated. O'Brien (1967), using the ^{133}Xe inhalation technique, investigated seven patients during the prodromal phase of migraine and also reported a reduction of approximately 20% in CBF.

In a later study, Sakai and Meyer (1978) also reported regional reduction of grey matter blood flow during the prodromal phase of migraine and consistent increases in these flow values during the headache. These same authors have more recently reported data on extracerebral flow in normal volunteers as well as migraine and cluster headache patients during different headache phases and under various experimental conditions (Sakai & Meyer, 1979). Among their findings was that extracerebral blood volume and/or flow was significantly increased during the headache phase in both cluster and migraine headache as compared with that of normal subjects during a resting state, further substantiating the extracranial involvement in the headache phase.

Although most of the studies measuring CBF tend to agree regarding the hemodynamic changes associated with the classic two-stage model of migraine, one must not overlook methodological limitations such as sampling biases and reliance on single cases when considering their conclusions. There are, as well, occasional reports presenting evidence that is divergent from the common findings. For example, Hachinski, Norris, Edmeads, and Cooper (1978) reported on 16 cases in which intramuscular injection of ergotamine tartrate had no effect on rCBF. Three of these cases were migraine patients, in whom rCBF was not altered during the prodromal or headache phase. These authors suggest that there may be considerable variation in the cerebral hemodynamics of migraine, both within and between individuals. Indeed, this is not a surprising finding given the frequent observation of individual differences in psychophysiological research (Greenfield & Sternbach, 1972).

As suggested by the discussion above, major emphasis has been

placed on the two-stage model of migraine. It is important to mention, however, that the original work of Wolff and his colleagues indicated a more complex change in the extracranial arteries preceding headache. Specifically, Tunis and Wolff (1953) observed that 36–72 hours prior to a headache the temporal artery proceeded through a series of modifications that included an initial vasodilation; this was followed by an increased lability in the artery (12–36 hours preceding headache), which was then succeeded by the classic vasoconstriction (6 hours preceding) and vasodilation with pain. Figure 1 illustrates these changes in the temporal artery. It is believed by the present authors that this four-stage process may be important to an adequate understanding of the influence of psychosocial stress on migraine (see section on psychophysiological mechanisms).

The evidence for intracranial vasoconstriction during the prodromal phase and passive vasodilation during the headache phase is substantial. In order to explain the actual experience of headache, however, extracranial vasodilation is not sufficient, since bilateral hyperpulsation of the temporal arteries can be observed during unilateral migraine attacks (Graham & Wolff, 1938) and extracranial distension equal to or greater than that recorded during a headache attack has been observed during headache-free periods (Dalessio, 1972). Both arterial distension and a lowering of the pain threshold appear to be necessary. A number of hypotheses have been advanced attempting to elucidate possible mechanisms in the production of these two "necessary ingredients." Among these, the serotonin and noradrenaline hypotheses have met with the greatest support.
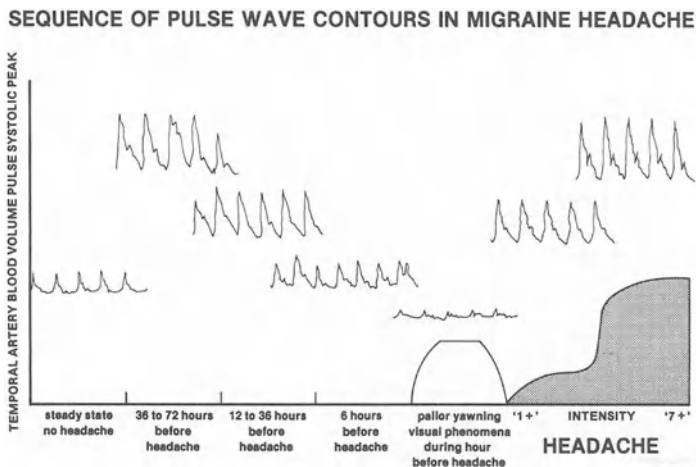
Figure 1. Representation of temporal artery changes throughout a 72-hour period prior to the onset of pain in migraine. The pulse waves graphically depict the vasodilation, lability, vasoconstriction, and vasodilation phases hypothesized to occur in the four-stage model of the pathophysiology of migraine. (Modified from Tunis & Wolff, 1953).

Sicuteri, Testi, and Anselmi (1961) were the first to report an increased excretion of 5-hydroxyindoleacetic acid (5-HIAA), serotonin's main metabolite, during migraine attacks. Subsequent reports have confirmed this finding (Curran, Hinterberger, & Lance, 1964; Kangasniemi, Riekkinen, & Rinne, 1972). A number of studies have also found increased plasma serotonin levels during the preheadache period and significant reductions in these levels during the attacks (Anthony, Hinterberger, & Lance, 1967; Hilton & Cumings, 1972). Thus, it appears that at the onset of the migraine attack, serotonin is released from platelets.

Fanchamps (1974) has outlined a possible mechanism by which this released serotonin might exert its effect, both on extracranial vessels and pain threshold. According to this formulation, the blood platelets release serotonin at the beginning of the attack as histamine and proteolytic enzymes are released from mast cells. A synergistic effect of serotonin and histamine increases capillary permeability, thus promoting transudation of a plasmakinin into the vascular wall. The combined action of plasmakinin and serotonin reduces the pain threshold of the arterial wall receptors. The reduced plasma serotonin level leads to a reduced tonus of the extracranial vessels and a synchronous capillary constriction, inducing passive extracranial dilation (serotonin has a vasoconstrictive effect on extracranial arteries and a vasodilative effect on capillaries). The two necessary ingredients are thus present: extracranial arterial distension and a lowered pain threshold.

Evidence for this hypothesis is considerable and comes from many sources (see Sicuteri, Anselmi, & Fanciullacci, 1974). For example, monoamine oxidase inhibitors, which prevent serotonin breakdown, have been shown to be of potential prophylactic value in migraine (Kimball, Friedman, & Vallejo, 1960). The administration of reserpine, which reduces serotonin level, has been shown to precipitate migraine attacks (Anthony, Hinterberger, & Lance, 1969) and to exert little or no effect on nonheadache subjects. It also appears that these attacks can be provoked with doses of reserpine that have only metabolic and no vasomotor effect, suggesting a more central mechanism. Reserpine-provoked headaches can, in turn, be relieved by injection of serotonin (Anthony et al., 1969).

Noradrenaline has also been implicated in the mediation of migraine. It has been argued that the vasoconstriction of the prodromal phase is the result of an increased release of noradrenaline from nerve endings to the affected vessels. Once sufficient vasoconstriction has occurred, the rebound vasodilation and concomitant pain ensues. Johnson (1978) has summarized the major research findings in support of the role of noradrenaline. Briefly these include (a) adrenergic vasoconstrictor innervation of the larger cerebral vessels, (b) decreased CBF in humans or induced scotomata following intravenous infusion of noradrenaline, (c) apparent changes in the diameter of cerebral vessels following electrical stimulation of their innervation in man and baboons, (d) increased concentration

of plasma noradrenaline and dopamine β-hydroxylase during the prodromal phase, and (e) reversal of noradrenaline induced cerebral vasoconstriction by α-adrenoceptor blockade (e.g., ergotamine).

In regard to MCH, Friedman (1979) suggested that psychological factors often induce the sustained contraction of the muscles of the head, neck, and shoulders and the relative ischemia in the involved muscles. These conditions often result in headache. Lance (1978) has further suggested that the inability to relax these muscles may not be sufficient to explain the disorder and that some additional, possibly inherited, factor might be involved. Potential factors contributing to this disorder include a vascular reactivity in the muscles of the scalp and neck with the accumulation of pain-provoking substances in muscle, or a central deficiency of inhibitory neurotransmitter substances (Lance, 1978).

Muscle tension appears to be involved in the MCH (Dalessio, 1972). However, it is unclear whether it is a secondary or primary phenomenon. In fact, Philips (1977b) questions the significance of muscular tension. Tunis and Wolff (1954) demonstrated a vasoconstriction of the scalp vessels in tension headache subjects, suggesting a relative ischemia in the involved muscles. This vasoconstriction could be responsible for the pain as vasoactive substances such as the dilator alcohol or constrictor ergotamine can relieve or exacerbate, respectively, the existing headache (Brazil & Friedman, 1957; Ostfeld, Reis, & Wolff, 1957). It has been further suggested that a central deficiency of monoamine transmitters might be involved (Rolf, Wiele, & Brune, 1977), in turn disrupting the antinociceptive system (Sicuteri, 1977). The precise physiological basis of muscle contraction headache is, however, still unknown.

Psychological Mechanisms

The role of psychological factors in physical health and illness has long been recognized (Weiner, 1977), and a number of theories have emerged attempting to specify the relationship between psychological events or constellations and migraine and MCH headaches (Adams et al., 1980; Alexander, 1950). In line with this thinking are a number of studies aimed at isolating psychological factors in headache subjects using more traditional approaches.

Unfortunately representative of the level of precision of most of these studies is the early comment of Friedman, Von Storch, and Merritt (1954), whose analysis of 1,000 MCH patients led them to conclude that "emotional factors are present in one hundred percent of these cases" (p. 782). Lance and Curran (1964) observed that approximately one third of their MCH patients were depressed, and Diamond and Dalessio (1978) have recently suggested that, "most patients with this form of headache are, in fact, suffering a depressive illness, with headache as one of their somatic complaints" (p. 97). Although one cannot deny the reciprocal

relationship between depression and pain symptomatology, a lack of empirical support necessitates a somewhat more cautious position. The suggestion to be mindful of an underlying depression when assessing these patients, however, should be heeded.

Those studies that have employed standard psychometric evaluation of MCH patients have yielded little, and most are lacking appropriate control groups. Martin, Rome, and Swenson (1967) and Martin (1972), in Minnesota Multiphasic Personality Inventory (MMPI) investigations, reported elevated scores on hypochondriasis (Hs) and hysteria (Hy) for tension headache sufferers. Otherwise, no consistent profile has emerged from these studies. The elevated Hs and Hy scores are not surprising given that these individuals do experience pain (Sternbach, 1974).

The popular belief that MCH patients exhibit high levels of neuroticism appears to arise from clinical data and, thus, may not be representative. Comparing groups of migraine, muscle contraction, and mixed cases in a general population, Philips (1976) found these headache types undistinguishable on three personality dimensions (extraversion, neuroticism, psychoticism) as measured by the Eysenck Personality Questionnaire (EPQ). Scores on the EPQ were within appropriate mean age norms except for a higher L score in the female migraine cases. It was suggested that persons in the health care professions might have constructed their view of a "headache personality" from the cases presented in clinics. Given that more than half of headache sufferers do not seek treatment (Waters & O'Connor, 1971), general statements regarding psychological characteristics are difficult to make.

The search for the parameters of the "migraine personality" has been somewhat more active than that involving MCH but has met with no greater success. To date, studies on the migraine personality have assessed migraine patients on the Wechsler Adult Intelligent Scale, MMPI, Eysenck Personality Inventory, Maudsley Personality Inventory, Cornell Medical Index, Buss-Durkee Scales of Hostile Attitude Behavior and Guilt, Rathus Assertiveness Schedule, Beck Depression Inventory, and a variety of original, usually nonstandardized, questionnaires. Harrison's (1975) extensive review of these studies highlights the absence of empirical support for the existence of a psychological deficit of etiological significance. As was the case with MCH, the only consistent MMPI findings are on the Hs and Hy scales. Inability to express anger—commonly suggested as a major characteristic of migraine—has not been well supported as a consistent facet of the elusive personality. Intelligence appears to be no different between migraine and nonheadache subjects. Bakal (1975) has suggested that the terminology employed in the traditional description of migraine has hampered investigation of the precise role of psychological variables. A situational or trait-by-situation perspective has been suggested as a more productive alternative to the traditional trait approach. For example, a more idographic analysis of psychological factors in headache sufferers might employ role-play assessments, daily

self-monitoring of mood, situational stressors, cognitive and behavioral responses to perceived stress, and unobtrusive observation whenever feasible. In combination with trait measures and psychophysiological data (e.g., stress reactivity) this might be a fruitful course vis à vis delineating affective and/or behavioral responses of etiological significance.

Psychophysiological Mechanisms

Due to the potential role of "stress" in the etiology of headache, a number of psychophysiological investigations have been conducted to elucidate the specific mechanisms by which stress could trigger headache. Of particular significance to a psychophysiological analysis of migraine is the identification of the effects of stress on temporal artery lability and/or the phasic temporal artery vasomotor response (i.e., dilation or constriction). A major focus on the skeletal muscle system has characterized the research on muscle contraction headache. One exception to this is recent work that suggests a significant tonic muscular component in most forms of migraine headache (Bakal & Kaganov, 1977; Philips, 1978).

The research on temporal artery reactivity to environmental stimuli falls into two categories: those studies evaluating the effects of low level nonaversive stimulation (Bakal & Kaganov, 1977; Price & Tursky, 1976) and those evaluating the effects of aversive stimuli (Cohen, Rickles, & McArthur, 1978; Feuerstein, Bush, & Corbisiero, in press). The work with nonaversive stimuli (orienting tones of 80db, neutral tape recordings, relaxation instructions, biofeedback tasks) indicates that the characteristic temporal artery response to these stimuli is vasoconstriction for the headache groups (migraine and muscle contraction) and vasodilation for the nonheadache controls. Given that the temporal artery response in normals is generally a vasodilation to novel stimuli (Sokolov, 1963), this work suggests that both migraine and MCH groups display a temporal artery deficit characterized by a tendency to constrict to any novel stimulation. However, the question regarding temporal artery change to aversive stimuli that might be more representative of naturally occurring stress was not addressed by this research.

Subsequently, Cohen et al. (1978) subjected both migraine and nonheadache controls to orienting stimuli (67-db tone), an aversive stimulus (mental arithmetic), and tasks requiring attention (reaction time and time estimation). These investigators did not observe the characteristic vasoconstriction response in the migraine group reported previously. In general, the temporal artery changes were both vasodilation and vasoconstriction that differed only as a function of the task each group was exposed to. Both groups exhibited a similar pattern across the tasks with right temporal artery surface temperature (used as an index of temporal blood flow) declining (vasoconstriction) from baseline through the reaction time task and then warming (dilating) during the mental

arithmetic task. In addition, migraine subjects had lower frontal elec-
tromyographic (EMG) levels than controls and similar increases in heart
rate and skin conductance levels during the mental arithmetic task.
Feuerstein, Bush, and Corbisiero (in press), monitoring temporal artery
blood volume pulse, obtained similar findings. Migraine, muscle contrac-
tion, mixed-headache, and nonheadache control subjects displayed tem-
poral artery vasodilation repsonses to aversive pain stimuli applied to the
index fingers. No differences were observed between groups. All groups
generated a pattern of digital blood volume pulse, frontal EMG, and spon-
taneous resistance responses indicative of a general arousal response
while the temporal artery dilated. These studies taken as a whole suggest
that at low levels of stimulation the migraine and MCH patients display a
vasoconstrictive response that differs from nonheadache controls,
whereas at higher levels of stimulation the response is reversed (i.e.,
vasodilation) and does not differ from headache-free controls. The impli-
cations of these findings are at present unclear. However, on close inspec-
tion of Wolff's initial data on the sequence of pulse amplitude changes
preceding a migraine headache presented in Figure 1, it is seen that an
initial vasodilation phase occurs approximately 36–72 hours before the
headache. It is this vasodilation that might represent the initial stage in a
complex four-stage sequence of temporal artery changes (vasodilation, la-
bility, vasoconstriction, vasodilation; see p. 212).

A plausible hypothesis regarding the effects of stress on the temporal
artery places major importance on the initial vasodilation phase. Specifi-
cally, if this dilation occurs in response to an intense change in emotional
state and if it is of sufficient magnitude and duration, it may initiate the
subsequent lability stage. This lability stage could represent an attempt
by the cephalic vasomotor system to return blood flow to homeostatic
levels. If the lability fails to correct the flow, the vascular system might
overcorrect or overcompensate or enter a state of heightened constriction,
thus triggering the classic two-stage vasoconstriction–vasodilation se-
quence.

These temporal artery changes involve a considerable time course
(36–72 hours), which makes verification difficult. However, the so-called
weekend headache, or "letdown" headache, can be explained by such a
model, as can the difficulty many patients have in reporting a temporal
contiguity between emotional distress and headache. Often patients indi-
cate that the stressful experience occurred a day or two prior to the onset
of the migraine. It is during this stressful period that the initial vasodila-
tion phase might be triggered.

This model must explain the finding that migraine, MCH, and
headache-free control subjects all respond to aversive stimulation with
vasodilation. Although there is no apparent difference in the initial re-
sponse to stimulation, the model assumes that the deficit in the migraine
group exists in the recovery of the vasodilation response to stress. Re-
search should be directed at investigating this recovery response. In addi-

tion, further support could be obtained from an analysis of the time course between daily subjective levels of distress and headache.

The role of stress as an etiological factor in muscle contraction headache and the mediating effects of elevated muscle contraction on pain itself have recently been questioned (see Harper & Steger, 1978; Philips, 1977b, 1978). Although observational studies (Tunis & Wolff, 1954) and case reports (Friedman, 1963; Malmo & Smith, 1955; Sainsbury & Gibson, 1954) suggest that stress, anxiety, or psychological "tension" is related to changes in skeletal muscle activity and head pain of a dull-ache or tight-pressure nature, Philips (1978) has argued that the major assumptions regarding the pathophysiology of muscle contraction headache are not well supported. Philips concludes that (1) resting EMG levels do not differentiate tension from migraine headache cases, although in general muscle contraction headache patients display higher levels of EMG than nonheadache controls, (2) little concordance exists among EMG levels measured in the laboratory, pain intensity, frequency of headache, and medication use, (3) EMG levels and pain intensity are not correlated during a headache episode, and (4) sustained elevations of EMG and not absolute levels appear to be critical in producing pain.

With regard to the EMG response to stress in muscle contraction headache, Bakal and Kaganov (1977) observed no differences in frontal EMG reactivity in migraine, tension, and nonheadache control subjects to an 80-db stimulus. A variety of response patterns were observed, with no consistent response to the stimulus in any group. Indeed, the only two controlled studies that report a difference between muscle contraction headache cases and nonheadache controls are those that have used college students recruited from classes as subjects (van Boxtel & Roozeveld, 1978; Vaughn, Pall, & Haynes, 1977). Although a study by Philips (1977b) using clinical cases did observe a significant increase in frontal EMG during a stressful task, this group was not compared to a control group and therefore the etiological significance of the finding is unclear, particularly in light of the findings of Feuerstein, et al. (in press) that similar increases are observed in the frontal EMG response to various stressors in MCH, migraine, mixed, and nonheadache control groups.

Despite the apparent simplicity of the effects of stress on headache mechanisms, the specific relationship for both migraine and MCH remains unclear. Methodological and conceptual advances could lead to an enhanced understanding of this relationship. At the methodological level, a more precise specification of headache type evaluated, quantitative measures of temporal artery reactivity, greater use of personally relevant stressors, and coordinated laboratory and ambulatory/naturalistic monitoring of physiological reactivity represent a few potential advances. Indeed the implementation of ambulatory monitoring to evaluate the effects of naturally occurring stress on pain mechanisms as well as pain behavior (drug use, activity level) and mood could provide the type of externally valid information lacking in the present laboratory studies.

Conceptually, a more comprehensive view of pain as a psychobiological phenomenon (e.g., Feuerstein & Skjei, 1979; Melzack, 1973; Sternbach, 1978; Weisenberg, 1977; Weisenberg & Tursky, 1976), including physiological and cognitive aspects, might enhance our understanding of the effects of stress on headache.

MANAGEMENT

To date there is no truly adequate treatment for chronic headache, particularly the migraine variant. The clinical approach to chronic headache is directed at prevention and/or management of the acute attack. There are no interventions that reverse the course of suspected etiological factors. Thus, technically, it is more accurate to refer to the *management* of chronic headache than to its *treatment.* A variety of management techniques have been attempted with chronic headache, ranging from surgery to psychotherapy. The intention of this section is to provide a critical review of these interventions.

Pharmacotherapy

Pharmacological agents are the most widely used approach to chronic headache management, with 73–90% of cases receiving some type of medication (DeLozier & Gagnon, 1975; Turner & Stone, 1979). For migraine, pharmacotherapy can be directed at the relief of acute headache or at prophylaxis. For control of the acute attack, ergotamine tartrate and various combined preparations (e.g., ergotamine and caffeine) are most widely used. The effect of ergotamine is believed to be the result of its capacity to induce a sustained vasoconstriction in the temporal arteries, thus interfering with the assumed pain mechanism or vasodilation. This approach is based on the early work of Graham and Wolff (1938) and the subsequent work of other investigators using isotope tissue clearance techniques and arteriography to measure blood flow changes following ergotamine administration (Friedman, 1968). Due to its potentiating effect, ergotamine has been combined with caffeine (e.g., Cafergot). Ergotamine and caffeine have also been combined with an antispasmodic and sedative (e.g., Cafergot–PB) to assist in counteracting the gastrointestinal distress often associated with migraine. Other combinations have included ergotamine with sedatives. This latter approach is directed at the autonomic imbalance assumed to be characteristic of vascular headache.

Although these various preparations do abort acute attacks in several cases, a number of side effects suggest that alternatives or adjuncts to medication might be helpful in reducing the need for these agents (Apesos & Folse, 1979; Friedman, 1972; Hokkanen, Waltimo, & Kallanranta, 1978; Lucas & Falkowski, 1973; Medina & Diamond, 1977). Dependence

on ergotamine has been reported with daily use. Increased tolerance can be associated with an increased frequency of headache and depression following withdrawal (e.g., Friedman, 1972; Lucas & Falkowski, 1973). Other difficulties associated with continued use include nausea, vomiting, gastric discomfort, diarrhea, paresthesias of the extremities, claudication of the lower extremities, stiffness of the thigh and neck muscles, transient tachycardia, localized edema, and itching in sensitive patients.

The prophylactic approach to migraine is directed at preventing vascular headache or, perhaps more realistically, reducing its intensity and frequency. Prophylactic drugs usually have no effect on the acute attack. Perhaps the most common agent used for prophylaxis is methysergide maleate (e.g., Sansert). Though methysergide is a potent serotonin antagonist, its specific mode of action in migraine remains unclear. This drug is often prescribed in cases of migraine in which headaches occur at a frequency of greater than one per week and are severe in intensity. Some reports suggest that approximately 70% of cases with common or classic migraine indicate that the drug is "effective" (Curran, Hinterberger, & Lance, 1967). However, Curran and Lance (1964) report that attacks are totally eliminated in approximately 26% of cases treated. This 26% total remission rate provides an important criterion level that could serve as a comparison figure for evaluating behavioral interventions. This appears particularly warranted given the fact that most of the behavioral approaches are primarily directed at the prevention of attacks rather than the control of the acute attack. An issue of particular relevance to the present chapter are the reports of potential side effects caused by long-term use of the methysergide agents. These include retroperitoneal fibrosis and gastrointestinal and CNS symptoms. In an effort to prevent the development of certain side effects, drug manufacturers recommend drug holidays at 6-month intervals during which the patient ceases taking the drug for 3–4 weeks. As with erotamine preparations, pharmacological or nonpharmacological alternatives to methysergide would prove quite useful in the management of migraine.

A second prophylactic agent that has been recently prescribed at increasing rates and presumably possesses fewer serious side effects is the beta-adrenergic receptor blocker, propranolol (e.g., Inderal). Although the mechanism of action of this agent with migraine is also unclear, it has been suggested that beta-adrenergic receptor blockade in cranial arteries prevents vasoconstriction, thus preventing the initiation of the two-stage constriction–dilation process in migraine (Diamond & Medina, 1976; Widerøe & Vigander, 1974).

Diamond and Medina (1976) concluded from a double-blind study of propranolol that 55% of the patients (classic and common migraine) "preferred" propranolol to placebo and that greater reductions in severity and frequency of headache, as well as analgesic and ergotamine use, were reported in the patients preferring propranolol. Other investigators report "effectiveness" (not remission) rates between 55 and 81% (Malvea,

Gwon, & Graham, 1973; Weber & Reinmuth, 1972; Widerøe & Vigander, 1974). It is important to note that prophylactic agents generally do not totally prevent attacks.

With regard to the treatment of muscle contraction headache, mild analgesics, sedatives or tranquilizers, and tricyclic antidepressants have been the medications most often prescribed. In moderate to severe cases, an analgesic–sedative combination is often used to control the acute attack (Friedman, 1968). Fiorinal is perhaps the widest used combination drug for tension headache. It contains aspirin, caffeine, phenacetin, and butalbital, a short-acting barbiturate. Friedman (1963) reported that headache relief was obtained in 71% of cases receiving this combination in contrast to 56% of those given analgesic alone. This drug is also prescribed for milder forms of migraine.

An interesting early study reported by Friedman and Merritt (1957) provides an important perspective on the use of medication and perhaps other suspected therapeutic agents in the management of chronic headache. Friedman and Merritt evaluated over 5,000 patients employing a double-blind crossover design in which the effects of two or more active drugs were administered to well-defined headache types and compared against placebo. The effects of a number of drugs on both symptomatic and prophylactic treatment of migraine and muscle contraction headache were evaluated. Specifically, 2,511 patients diagnosed with migraine were treated symptomatically with analgesics, antispasmodics, CNS stimulants, sedatives, sympatholytics, vasoconstrictors, or vasodilators. The average response to all drugs tested was 46%, indicating that 46% of the cases reported "improvement." Within this group, ergotamine tartrate plus caffeine was reported to result in symptomatic relief for 83% of the patients. Placebo was effective in only 25% of the patients. When the effects of the so-called prophylactic agents (analgesics, antihistamines, antispasmodics, CNS stimulants, histamine, hormones such as estradiol, testosterone propionate, sedatives, sympatholytics, vasoconstrictors, vasodilators, and vitamins such as B-12 and nicotinic acid) were assessed on 1,644 migraine cases, 54% reported improvement irrespective of type of medication. The greatest percentage of patients (65%) indicated that the sympatholytic (dihydrogenated ergot alkaloids) agents were of most assistance. However, unlike the drugs for acute attacks, placebo medication was almost equally effective, with 50% reporting improvement.

With regard to muscle contraction headache, symptomatic relief was reported in 67% of 1,082 patients. The most effective drug was a combination of analgesic, sedative, and caffeine (effective in 71%). However, unlike symptomatic relief for migraine, where placebos were relatively ineffective, relief was reported following placebo use in 55% of the muscle contraction headache patients. In the 2,185 patients treated for prevention of muscle contraction headache, the average response achieved with all drugs was 56%. No agent appeared to be superior, and the use of placebos resulted in an equivalent percentage of improvement, with 55%

responding to placebo and 55–62% responding to antispasmodic plus sedative, analgesic plus sedative and CNS stimulant, vitamins, and antispasmodic plus sedative and vasoconstrictor and vasodilator agents.

These results suggest that a considerable nonspecific effect can be expected in the prophylactic treatment of migraine and in both the symptomatic and prophylactic treatment of muscle contraction headache. In the majority of drug studies where appropriate controls were included, the percentage improvement rates for the preventive agents used in migraine management range from 50 to 65%. When placebo can result in 50% improvement, it is reasonable to suggest that gains from these "active" agents should perhaps be scrutinized more carefully. This becomes even more salient when considering treatment of muscle contraction headache.

Friedman and Merritt's findings have implications for the research on nonpharmacological approaches to headache, clearly illustrating the need for inclusion of placebo controls. Despite the fact that these results were reported a decade or so before the early investigations of the utility of nonpharmacological approaches to headache (e.g., Budzynski, Stoyva, & Adler, 1970), very few investigators employ placebo controls. Indeed, only two of the six controlled group outcome studies[1] evaluating the effects of various nonpharmacological techniques on migraine included a placebo control (Friar & Beatty, 1976; Mullinix, Norton, Hack, & Fishman, 1978). For studies concerned with MCH, the ratio is two out of seven. If we are ever to develop truly effective nonpharmacological treatment methods for chronic headache, our research designs must at least reflect the sophistication of controlled clinical drug trials.

Nonpharmacological Intervention

Over the past decade, a number of nonpharmacological interventions have emerged as adjuncts or alternatives to the conventional pharmacological management of headache. These interventions fall into four major categories: hypnotic procedures, relaxation techniques, biofeedback, and various combinations of these strategies.

Migraine

Hypnosis. A variety of hypnotic techniques has been used in the treatment of migraine. Hypnosis most often involves some form of relaxation in conjunction with hypnotic procedures designed to modify pain perception and/or the emotional state of the patient. Posthypnotic suggestions have also been implemented. The general approach is ultimately directed at self-hypnosis where the patient is able to implement specific

---

[1] A controlled group outcome study includes at the minimum a comparison of two treatment groups, which can include a non-treatment control as one of the groups.

strategies to reduce autonomic arousal, modify pain, and enhance "self-perception." Specific techniques used with migraine include hypnotic relaxation, glove anesthesia, symptom transformation via imagery, and ego-strengthening suggestion (Anderson, Basker, & Dalton, 1975; Andreychuk & Skriver, 1975; Graham, 1975; Kroger, 1963). Two of these studies (Anderson et al., 1975; Andreychuk & Skriver, 1975) warrant discussion because of their unique contribution to the literature. Anderson et al. (1975) provide the only comparison of a nonpharmacological technique with a pharmacological intervention reported in the migraine literature and Andreychuk and Skriver (1975) evaluate the influence of expectancy on outcome through the use of a hypnotic-susceptibility scale.

In the Anderson et al. (1975) study, a self-hypnotic approach that included a minimum of six sessions of "ego-strengthening" suggestions in conjunction with a visualization technique (patient instructed to visualize changes in the temporal arteries) was compared to prochlorperazine (Stemetil), a prophylactic drug used in migraine management. Patients in the drug group were also permitted to use ergotamine preparations at the first warning of the attack. Assignment to treatment was random and all treatment was conducted by experienced clinicians in the field. Monthly progress reports based on patient interviews were completed by the practitioner. The results were analyzed in terms of change in frequency and severity of attacks during the first and last 6 months of treatment. Significant reductions in the frequency of attacks and in the number of cases reporting severe attacks were observed in the hypnosis group only. Moreover, the percentage of cases with complete remission during the last 3 months of the trial was 44% in the hypnosis group and 13% following treatment with Stemetil. Although the absence of a placebo or attention control group limits this study with regard to the specific effects of hypnotherapy, this investigation suggests the superiority of a self-hypnotic procedure over the prophylactic Stemetil. Additional research comparing the more potent prophylactic agents with hypnosis would prove quite useful in addressing the question of drugs versus psychological techniques. The combination of medication with psychological techniques also requires systematic investigation.

Andreychuk and Skriver (1975) compared the effects of thermal biofeedback training, EEG-alpha enhancement biofeedback training, and training in self-hypnosis on migraine. All subjects also received instruction in relaxation. The hypnotic procedure included visual imagery, verbal reinforcement and direct suggestions for coping with pain that were presented on audiotape. The results indicated that following training significant improvement in headache index scores (hours duration × severity) was achieved in all three groups, with no differences observed between groups. Hypnotic susceptibility was also measured using the Hypnotic Induction Profile (HIP). The mean percentage improvement scores were significantly greater for those with high HIP scores (71%) than for

those with low scores (41%). The high-susceptibility subjects responded better to treatment regardless of the technique they had received, suggesting the role of expectation on outcome. Whereas expectations might have accounted for symptom reduction in all groups, the equivalent outcomes could have been due to the relaxation training administered to all subjects (Blanchard, Theobald, Williamson, Silver, & Brown, 1978).

Relaxation Techniques. The relaxation therapies are perhaps the most widely used single nonpharmacological approach for the treatment of migraine. It is therefore surprising to note that there are few controlled-outcome studies evaluating the specific effects of various forms of relaxation training on migraine. Moreover, the one controlled investigation that has been conducted was only recently reported (Blanchard *et al.*, 1978). This investigation will be discussed in detail in the section on biofeedback techniques.

A variety of relaxation techniques are used in the clinical management of migraine. Certain variations involve instructing the patient to tense and subsequently relax a number of gross muscle groups throughout the body in an effort to produce a lower tonic state of muscular activity and to identify subtle differences in muscular tension (progressive muscular relaxation). Other approaches utilize passive relaxation instructions that involve the suggestion of certain desirable physiological sensations associated with relaxation. Still others involve combinations of these procedures. One such approach, autogenic training, is a frequently used technique that involves a passive suggestive type of relaxation. Presently, most forms of autogenic training have been modified from the original approach (Schultz & Luthe, 1959) to simply include a set of standard phrases the patient repeats in an effort to produce a parasympathetically dominated state.

The goal of each of these variants of relaxation is the modification of the overreactive sympathetic nervous system, presumably a characteristic of the migraine patient. Secondary effects involve the reduction of skeletal muscular activity. The training is structured such that the patient ultimately learns to elicit a "relaxation response" that involves a state of physiological and mental relaxation simply through recall. This relaxation response is practiced daily and implemented as an active coping skill in the presence of situations that can trigger a stress response. Thus, by preventing elevated levels of autonomic arousal, the approach acts as a prophylactic treatment. In addition, patients with milder forms of migraine have reported the ability to reduce headache severity when the relaxation response is effectively elicited during the headache.

Of particular interest in the relaxation literature is the use of group relaxation, as reported by Hay and Madders (1973), who found that 79% of 120 cases indicated "improvement" following such an approach. The relatively high success rate of this study, though uncontrolled, suggests that this form of relaxation training should be evaluated more closely, particularly in light of the Blanchard *et al.* (1978) findings indicating the

equivalent effects of relaxation and thermal biofeedback. A second important issue regarding relaxation is illustrated in Benson, Klemchuk, and Graham (1974). These authors did not report a significant reduction in headache symptomatology following training in transcendental meditation, suggesting that, unlike the treatment of hypertension (Blanchard & Miller, 1977), not all forms of relaxation training are similar in their clinical utility. Evaluation of the several variants of relaxation would prove useful. Particular emphasis should be placed on various individual differences, both psychological and psychophysiological, when such an investigation is conducted with the goal of identifying optimal patient–technique combinations.

Biofeedback.   Biofeedback has also been widely implemented in the management of migraine. The biofeedback approaches most commonly used for migraine or mixed migraine–muscle contraction headache include frontal EMG, digital temperature or thermal feedback, extracranial temporal artery feedback, and combinations of these modalities. The goals of biofeedback training include either one or both of the following: (1) relaxation or reduction in skeletal and/or autonomic concomitants of arousal; (2) modification of presumed peripheral pain mechanisms. To achieve either of these goals, biofeedback therapy involves the patient in a continuous interchange with a physiological monitoring device in which the ultimate goal is the self-regulation of a target physiological response or psychophysiological state. Specifically, during a training session the patient is provided with information or feedback regarding the ongoing state of a physiological response. This information is presented in the form of an auditory signal or visual display that is proportional to the continuous changes in the monitored response. The patient is instructed to modify the target response in the desired direction using a trial-and-error procedure, with success indicated by the feedback device. A variety of cognitive strategies (e.g., various mental images, blanking the mind, etc.) have been reported to be associated with the desired physiological changes. Often the therapist or trainer is involved in an active dialogue with the patient in an effort to identify a reliable strategy or set of strategies that could be associated with the elicitation of the desired response. Patients are instructed to practice the strategies at home between sessions. The ultimate goal is for the patient to generate the desired response without the aid of feedback instrumentation (i.e., voluntary control).

Electromyographic, thermal, or GSR (galvanic skin resistance) feedback have been used to facilitate the learning of relaxation skills and to reduce the autonomic and skeletal muscle concomitants of migraine. This goal is similar to standard forms of relaxation training. In addition, as previously mentioned, biofeedback is also used to modify peripheral pain mechanisms involved in migraine. With this as a treatment goal, the patient is taught to reduce muscle tension in specific muscle groups of the head and neck through EMG feedback or to constrict the extracranial

temporal artery through temporal artery vasoconstriction training. The EMG approach is based on the underlying assumption that both the mixed variant of migraine and common migraine involves sustained elevations of muscle tension in the head and neck. This increased EMG activity can occur prior to and in reaction to the vascular component. As with relaxation training, the patient is instructed to use the technique daily as well as prior to and during the headache.

In temporal artery constriction training the patient is instructed in a procedure designed to develop self-control over the extracranial temporal arteries. This approach is also referred to as blood volume pulse (BVP) constriction training. The rationale for this technique is partially based on the pharmacological treatment of migraine with ergotamine tartrate (Dalessio, 1972). In addition, it is argued that if a patient can learn to control temporal artery constriction and practices the technique daily, the probability that the artery will enter the labile state, which presumably occurs 72 hours preceding the headache, might be reduced. This could prevent the sequence of temporal artery changes that result in headache. In theory, the temporal artery approach is directed at the acute attack as well as providing a potentially prophylactic strategy.

As Table I indicates, the outcome literature includes evaluations of EEG alpha, frontal EMG, thermal, and temporal artery feedback and combinations of these modalities. A limited number of subjects have been used in the evaluation of the specific modalities. However, as Table II illustrates, the combination of techniques with various relaxation approaches has been evaluated with larger patient samples. It is beyond the scope of this chapter to provide a detailed review of this literature; only a few key studies will be discussed. For a more detailed review, the reader is referred to Adams et al. (1980), Blanchard, Ahles, & Shaw (1979), and Jessup et al. (1979).

Blanchard et al. (1978) compared the effects of combined thermal feedback–autogenic training, progressive-relxation training, and waiting-list control on migraine. The outcome measures included self-report of frequency, intensity, and duration of headache as well as medication use. Patients were seen twice weekly for a total of 12 sessions and were instructed to practice their respective exercises two or three times daily at home. The waiting-list control patients monitored headache activity for the duration of baseline and treatment. An analysis of immediate post-treatment effects indicated that both the relaxation and biofeedback–autogenic training groups but not the control group improved on total headache activity, duration of headaches, maximum headache intensity, and analgesic use. All three groups, however, reported a reduction in headache frequency per week, suggesting the potential reactivity of this measure, perhaps a result of self-monitoring, expectation, and/or regression to the mean. Follow-up at 1, 2, and 3 months revealed that both treatment groups were maintaining their equivalent gains.

Blanchard et al. (1978) suggested that these similar gains could be the

result of instruction in relaxation, broadly defined, with emphasis on achieving a self-directed calm-relaxed attitude. In a subsequent review of the literature on the use of biofeedback and relaxation for a number of psychophysiological disorders, Silver and Blanchard (1978) concluded that the final common pathway for both techniques appears to be a reduction in sympathetic nervous system activity. Some limited data are available to support this hypothesis with migraine. Kentsmith, Strider, Copenhaver and Jacques (1976) have reported on a single case in which decreased levels of plasma dopamine β-hydroxylase activity (enzyme involved in conversion of dopamine to norepinephrine) were obtained following symptomatic improvement with a relaxation–thermal feedback technique. Although only suggestive, the hypothesis of Silver and Blanchard (1978) warrants further investigation. Additional efforts in this area are particularly important given that the assumption that migraine patients exhibit an overly reactive autonomic nervous system is not as well supported as is generally thought (Cohen, 1978; Feuerstein, Bush, & Corbisiero, in press).

Mullinix et al. (1978) reported results from the only placebo-controlled evaluation of thermal training to date. These investigators compared the effects of thermal feedback with false thermal feedback designed to act as the placebo. The results indicated that a significant increase in digital temperature was achieved in the true feedback group only, although both the true- and false-feedback groups demonstrated equivalent improvement in headaches. This study suggests that nonspecific factors can play a significant role in the success of the thermal approach.

In regard to temporal artery vasoconstriction training, Friar and Beatty (1976) evaluated the therapeutic effects of eight sessions of either temporal artery constriction training (active treatment) or digital vasoconstriction training conceptualized by the authors as an attention control. Posttraining results indicated that the temporal artery feedback, but not the digital feedback, group demonstrated constriction of the extracranial arteries during a voluntary control assessment. Pre- to posttreatment analysis indicated a significant reduction in the number of major attacks (over 3 hours) and total number of headaches per month in the temporal artery group and not in the control group. This study, though providing the first controlled group outcome study evaluating temporal artery feedback training, is limited by the absence of follow-up data. A more recent report on the efficacy of the temporal artery biofeedback approach, in which some follow-up data are reported, is provided by Bild and Adams (1980). These investigators compared frontal EMG feedback, temporal artery blood volume pulse (BVP) constriction feedback, and waiting-list control groups. Treatment consisted of 10 sessions of either EMG or BVP feedback training. The results indicated that both the EMG and BVP groups acquired voluntary control of the specific targeted response and that this control appeared to be associated with a modest reduction in

TABLE I. BIOFEEDBACK TECHNIQUES FOR MIGRAINE HEADACHE

Investigator	Modality	Design	Number of subjects	Headache outcome [a]
Gannon & Sternbach, 1971	Occipital EEG alpha feedback	Anecdotal case report	1	3-month follow-up: sometimes able to prevent onset, no ability to control pain
Wickramasekera, 1973	Frontal EMG feedback followed by thermal feedback	Systematic case study	2	3-month follow-up: reduction in duration and intensity of head-ache maintained resulting from thermal feedback and not EMG feedback
Johnson & Turin, 1975	Thermal feedback (cooling & warming)	Systematic case study	1	Posttraining reduction in fre-quency and duration of headache during hand warming only; no follow-up
Turin & Johnson, 1976	Thermal feedback (cooling & warming)	Single-group outcome study	4	Posttraining reduction in fre-quency and duration of headache during hand warming only; no follow-up
Friar & Beatty, 1976	Temporal artery con-striction vs. digi-tal constriction	Controlled group outcome study	9 per group	Posttraining reductions in fre-quency in temporal artery group only; no follow-up
Feuerstein, Adams, & Beiman, 1976	Frontal EMG followed by temporal artery constriction	Controlled single-subject experiment	1	9-week follow-up: reductions in frequency and duration of headache

Feuerstein & Adams, 1977	Frontal EMG and temporal artery constriction	Controlled single-subject experiment	2	8-week follow-up: reductions in frequency and duration of headache
Sturgis, Tollison, & Adams, 1978	Frontal EMG and temporal artery constriction	Controlled single-subject experiment	2	16-week follow-up: complete remission
Blanchard, Theobald, Williamson, Silver, & Brown, 1978	Thermal feedback vs. relaxation vs. waiting-list control	Controlled group outcome study	10 per group	12-week follow-up: reductions in frequency and duration in both treatment groups
Mullinix, Norton, Hack, & Fishman, 1978	Thermal feedback vs. placebo thermal feedback	Controlled group outcome study	6, thermal 5, placebo	Posttraining: similar improvement in both thermal and placebo groups; no follow-up data reported
Bild & Adams, 1980	Temporal artery constriction feedback vs. frontal EMG feedback vs. waiting-list control (WLC)	Controlled group outcome study	7, temporal artery 6, EMG 6, WLC	Posttraining: similar reduction in headache duration/week in both temporal artery and EMG feedback groups; no reduction in WLC group; 6-week follow-up: temporal artery group evidenced greatest reduction in vasoconstrictors while maintenance of reduction in duration persisted in both temporal artery and EMG groups

aTable does not include information on specific physiological outcome. For data regarding this variable, refer to Adams *et al.* (1980).

headache duration per week. No significant reduction in frequency was observed in any of the three groups. At a 6-week follow-up, a significant reduction in the percentage of vasoconstrictor medications was observed in the BVP group only. In addition, the BVP group was the only group that decreased use of vasoconstrictors, mild and strong analgesics, and sedatives. A 3-month follow-up conducted on the BVP group only indicated that the reduction in headache duration was maintained.

In addition to these two group outcome studies, a number of experimental single-case studies evaluating temporal artery feedback have been reported (Feuerstein & Adams, 1977; Feuerstein, Adams, & Beiman, 1976; Sturgis, Tollison, & Adams, 1978). The controlled-group and single-case research conducted to date provide support for the superiority of the temporal artery feedback technique over attention and waiting-list controls and frontal EMG feedback training. However, larger scale studies comparing the technique with the current treatments of choice for migraine, such as relaxation training and thermal biofeedback, and a credible placebo will provide more definitive data on the clinical utility of this approach.

Combined Techniques. Though individual techniques are implemented in the management of migraine, combined intervention strategies are the most frequently used approaches in clinical practice. These approaches involve the concurrent or sequential use of multiple techniques. For example, combinations of hypnosis, EMG, and thermal feedback might be attempted, or autogenic training in conjunction with EMG and thermal feedback. Unfortunately, at this point there are no empirically validated guidelines regarding which combinations would be most appropriate for what type of migraine (common, classic, mixed). As Table II indicates, only one of the studies published has used a controlled group outcome design (Mitchell & Mitchell, 1971). As with the biofeedback techniques, only select studies will be discussed. Table II provides a summary of the major aspects of each study in this category.

Mitchell and Mitchell (1971) reported two studies. The first involved the comparison of a combined desensitization–assertion training technique with relaxation training and a no-treatment control. Following 15 sessions of treatment, subjects in the combined desensitization group reported a significant reduction in frequency and duration of headaches over a 32-week period, whereas no significant change was observed in the relaxation or no-treatment control groups. The absence of significant change following relaxation therapy is contradictory to the results of Blanchard *et al.* (1978) and is curious, given that both studies used an equivalent relaxation approach.

The second study report by Mitchell and Mitchell (1971) included a comparison of no treatment, desensitization, and combined desensitization–assertion training. Patients included those with and without prior unsuccessful drug therapy. All treatments were limited to 15 sessions. The results indicated that both combined desensitization

TABLE II. MULTIPLE INTERVENTIONS FOR MIGRAINE HEADACHE

Investigator	Techniques	Design	Number of subjects	Headache outcome[a]
Mitchell & Mitchell, 1971, Study I	Combined desensitization (CD) vs. relaxation training (RT) vs. no-treatment control (NTC)	Controlled group outcome study	7 per treatment group	32-week follow-up, mean % reduction in frequency: CD = 76%; RT = 24%; NTC = 2%
Mitchell & Mitchell, 1971, Study II	Combined desentization (CD) with and without prior drug treatment vs. systematic desensitization (SD) vs. no-treatment control (NTC)	Controlled group outcome study	5 per treatment group	32-week follow-up, mean % reduction in frequency: CD = 95%; CD (drug failures) = 64%; SD = 41%; NTC = 7%
Weinstock, 1973	Self-hypnosis, EMG, and thermal feedback plus coping strategies	Systematic case study	7	Brief follow-up: total remission in all 7 cases
Sargent, Green, & Walters, 1973	Thermal feedback plus autogenic phrases	Single-group outcome study	20	Indicated to be followed up in 2–3 years
Sargent, Walters, & Green, 1973	Thermal feedback plus autogenic phrases	Single-group outcome study	64	150-day follow-up: 81% of 42 cases improved to a "significant degree"

(continued)

TABLE II (*continued*)

Investigator	Techniques	Design	Number of subjects	Headache outcome[a]
Andreychuk & Skriver, 1975	Self-hypnosis including relaxation vs. thermal feedback and autogenic training vs. EEG alpha feedback	Controlled group study	11 per group	Posttraining: all 3 groups indicated significant reduction in headache activity (intensity × duration); no follow-up
Paulley & Haskell, 1975, Study I	Relaxation training plus individual psychotherapy	Single-group outcome study	51	1–8-year follow-up: 61% reported "major improvement"
Paulley & Haskell, 1975, Study II	Group relaxation plus group psychotherapy	Single-group outcome study	28	½–3-year follow-up: 79% reported "major improvement"
Mitch, McGrady, & Iannone, 1976	Thermal feedback plus autogenic training	Single-group outcome study	20	6-month follow-up: global ratings of "improvement" were maintained in 10 cases (50%)
Medina, Diamond, & Franklin, 1976	Frontal EMG feedback plus thermal feedback plus autogenic phrases	Single-group outcome study	27	14-month follow-up: global ratings indicate "improvement" in 13 cases (48%)
Lambley, 1976	Assertion training plus brief psychodynamic therapy	Controlled single-subject experiment	1	5-month follow-up: complete remission; 9-month follow-up "occasional" headache

Mitchell & White, 1977	Self-recording vs. self-monitoring vs. self-monitoring plus desensitization (Stage 1) and vs. self-monitoring plus desensitization plus cognitive behavior therapy (Stage 2)	Controlled single-subject experiment	3 per group	Posttreatment: self-recording and monitoring, no effect; Stage 1, 45% reduction in headache frequency; Stage 2, 73% reduction in headache frequency; 3-month follow-up: reductions increased to 55% (Stage 1) and 83% (Stage 2)
Werbach & Sandweiss, 1978	Thermal feedback or skin conductance feedback or frontal EMG feedback in addition to abdominal breathing, progressive relaxation, meditative mantras, and autogenic phrases	Single-group outcome study	37	Posttraining: 73% rated as "improved"
Fahrion, 1977	Thermal feedback plus autogenic phrases or frontal EMG feedback plus autogenic phrases	Single-group outcome study	21	Average of 10-month follow-up: 72% were rated as "improved," with improvement ranging from "slight" to "very good"
Gainer, 1978	Assertion training, desensitization, thermal feedback, and "temperature discrimination training"	Controlled single-subject experiment	1	8-month follow-up: significant reduction in frequency, duration, intensity, disability, and medication intake

[a]Table does not include information on specific physiological outcome. For data regarding this variable, refer to Adams *et al.* (1980).

groups reported a significantly greater reduction in migraine frequency than either the systematic desensitization or no-treatment control groups. No significant differences were found between the systematic desensitization and the no-treatment control groups. The combined desensitization group with no prior drug therapy reported the greater reduction in migraine frequency (95% mean reduction).

Although both Mitchell and Mitchell studies suggest the superiority of a combined desensitization–assertion training approach in the treatment of migraine, this conclusion is limited by the small number of subjects used. In addition, the rationale for the combined desensitization–assertion training is not well substantiated. It is based on a set of assumptions that include the presence of (1) constricted overt emotional expression, (2) chronic covert emotional overreactivity, and (3) excessive sympathetic nervous system activity manifested via hypersensitive cranial arteries. Essentially, Mitchell and Mitchell are arguing that a deficit in social skills or assertive behavior results in an overreactive autonomic nervous system response to interpersonal stressors. These conditions trigger the sequence of temporal artery changes, leading to pain in migraine. Unfortunately, there is no empirical support for this proposed mechanism. In fact, with respect to deficits in assertive behavior, research in our laboratory suggests that migraine patients do not respond differentially to various analogue situations requiring positive or negative assertive behaviors in comparison to muscle contraction, mixed, or nonheadache controls (Feuerstein, Woo, & Zeichner, 1980).

There are no additional controlled studies in the combined intervention category. The various single-group outcome studies presented in Table II suggest that although the specific effects of thermal feedback plus autogenic training or combined frontal EMG feedback, thermal feedback, and autogenic training cannot be determined, these various treatment packages result in an "improvement" rate of 48 to 72% at a minimum of 6 months posttreatment. At 14-month follow-up, the combined frontal EMG, thermal feedback, and autogenic training package results in 47% of cases rated as "improved" (Medina, Diamond, & Franklin, 1976), and at 10-month follow-up 72% were rated as "improved" following a combination of thermal feedback and autogenic training or frontal EMG feedback and autogenic training (Fahrion, 1977). Relaxation training in conjunction with individual psychotherapy resulted in 61% indicating "major improvement," whereas group relaxation and group psychotherapy resulted in 79% reporting "major improvement" (Paulley & Haskell, 1975). Although limited by the sophistication of research design, it is informative to compare the findings of Hay and Madders (1973) with those of Paulley and Haskell (1975). Hay and Madders (1973) reported a 79% improvement rate with group relaxation, and identical improvement was reported by Paulley and Haskell (1975) using group relaxation in conjunction with group psychotherapy. The addition of psychotherapy to relaxation does not appear to add to the clinical utility of relaxation therapy.

Taken as a whole, what are the differential effects of the various nonpharmacological techniques for migraine? Prior to presenting generalizations regarding the effects of these procedures, a note of caution must be rendered. The outcome literature is characterized by lack of appropriate control groups, (both waiting-list and placebo), poor specification of headache type (i.e., classic, common, mixed, cluster), inadequate baseline and follow-up data, unsophisticated analytical techniques, inadequate definition of outcome criteria, lack of standardized follow-up data collection procedures, and limited analysis of the multidimensional aspects of human pain (e.g., impact on interpersonal, occupational, and sexual aspects of life). In addition, when one considers the controlled studies or the uncontrolled group studies with relatively long-term follow-ups, the results are not as convincing as is generally assumed. The majority of studies only report percentage improvement, and, when absolute data on frequency, duration, and severity are presented, the follow-up figures rarely indicate complete remission. Medication data are often not reported. Therefore, it is difficult to draw definitive conclusions regarding the clinical utility of specific techniques.

Considering these limitations, the outcome literature suggests the following: (1) The relaxation, biofeedback, and combined techniques result in approximately a 60–70% improvement rate immediately following treatment. This improvement appears to be maintained for at least 3 months. Improvement is generally based on an estimate of the elimination or reduction in headache frequency, intensity, duration, and/or medication intake. (2) Clinical effects are anecdotally related to the extent of practice, with those patients practicing regularly demonstrating the largest and longest acting change. (3) In preliminary research, thermal feedback resulted in equivalent improvement to that of a placebo biofeedback technique, suggesting that the effects of this technique might be the result of a nonspecific placebo response. (4) Temporal artery constriction feedback has been demonstrated to be superior to attention and waiting-list controls. (5) Both thermal feedback and relaxation training result in significant and equivalent improvement following 12 sessions of treatment. These results were maintained at 3-month follow-up. This finding suggests that either both outcomes are the result of placebo or perhaps the result of a generalized reduction in sympathetic nervous system activity. (6) Possibly the most promising consequence of these techniques is the consistent observation of reductions in a number of pain-related medications, including vasoconstrictors, strong analgesics, and analgesic–sedative combinations.

Childhood Migraine

The incidence of migraine in children, the severe nature of associated symptoms in select cases (e.g., head banging, vomiting followed by sleep), and the undesirable practice of prescribing analgesics or vasoconstrictors to children illustrate the need for effective nonpharmacological ap-

proaches in the treatment of childhood migraine. Despite this need and the general finding that autonomic regulation appears easier to achieve in children (Loughry-Machado & Suter, 1979), the use of biofeedback or combined biofeedback–relaxation approaches has not been adequately evaluated in this clinical population. Two reports have indicated the potential of this approach with children.

Diamond and Franklin (1976) have reported the results from a clinical series of 32 children and adolescents (9–18 years old, average age = 14.3) with migraine. The treatment consisted of autogenic training augmented with EMG and thermal feedback training. Outcome was rated as follows: *good*—decrease in frequency and severity of migraine; *fair*—decrease in either frequency or severity but not both; or *no response*. It is unclear at what point in treatment or follow-up the treatment response was determined. A good response was observed in 81.3% (26/32), a fair response in 9.4% (3/32), no response in 6.3% (2/32), and 3.1% were lost in follow-up. There were no data on the physiological responses to the training protocol.

In an uncontrolled series of case studies, Werder (1978) treated four migrainous children (3 girls, 1 boy), with an age range of 10–17 years, using combined thermal feedback, relaxation, and autogenic training. Following six weekly sessions (one case was seen intensively for 5 consecutive days), all children learned to increase hand temperature. Medication was reduced 33–50% by the third week of training. Four months following the onset of treatment, three of the four cases were headache and medication free. The elimination of medication is a particularly significant finding given that these children were regularly using either mild analgesics, vasoconstrictors, or analgesic–sedative combinations.

Given the potential of these techniques with younger cases, controlled trials of these various procedures should be conducted. Difficulties in obtaining accurate self-reports in younger cases must be addressed in this research, and self-monitoring methods should be modified.

Muscle Contraction Headache

The techniques used in the treatment of MCH include various forms of relaxation training, covert modeling combined with systematic desensitization (Daniels, 1973), frontal EMG feedback, operant therapy (Fowler, 1975), cognitive coping-skills training (Holroyd, Andrasik, & Westbrook, 1977; Reeves, 1975), and various combinations of these techniques (Beaty & Haynes, 1979). With the exception of operant therapy, the rationale for the use of these techniques with MCH is based on the assumption that the dull aching pain experienced as MCH is the consequence of a variety of cognitive and interpersonal factors. Specifically, it is assumed that the appraisal of a situation as threatening results in a heightened state of sympathetic and somatic (skeletal) arousal. If the arousal is prolonged by repeated stimulation and the skeletal muscles of

the head and neck undergo a sustained tonic elevation, pain is experienced (Dalessio, 1972). Consequently, approaches designed to instruct the individual in strategies that modify this arousal response should result in significant improvement in headache symptomatology. In addition to procedures directed at the phasic aspect of MCH such as systematic desensitization, stress inoculation, and some forms of relaxation and biofeedback, treatment has also been directed at the modification of tonic levels of muscle contraction through the use of biofeedback or relaxation techniques. With this approach, the goal is to reduce resting levels of presumably elevated muscle activity in the MCH patient. Perhaps in part due to considerable individual differences among patients both in tonic EMG levels and in the tendency to produce an overreactive EMG response to stress, it is difficult to formulate generalizations concerning treatment efficacy. The major assumptions underlying these approaches are not well supported, which may account for lack of consistent remission of MCH.

In addition to the arousal reduction techniques, social learning approaches with considerable emphasis on operantly based intervention have been reported (Fowler, 1975). In an anecdotal case study of an inpatient, Fowler implemented a treatment package including social reinforcement contingent on non–pain behavior, administration of pain medication on a fixed interval schedule, and rest contingent on the completion of specified tasks. The patient had a long history of chronic pain. Following treatment, complete remission was achieved, suggesting the potential of such an approach in more severely disabled cases. Wooley, Blackwell and Winget (1978) also provided a potentially clinically useful social learning–based treatment program with emphasis on improvement in physical symptoms, social functioning, specification of life plans, and generalization of treatment gains.

Despite the occasional evaluation of the use of behavioral techniques other than EMG feedback and relaxation, these two approaches constitute the most widely used nonpharmacological techniques for MCH. As specified in Table III, the well-controlled outcome literature primarily consists of comparisons of these techniques with each other or combinations of these approaches in comparison to placebo or no-treatment controls. Table III presents only the controlled group outcome studies. Although a number of interesting case reports and experimental single-case studies exist, in interest of brevity the present authors selected for discussion the more rigorously controlled studies in the area. However, as reviewed by Beaty and Haynes (1979), even these studies are not without limitations, some similar to the migraine literature.

Table III indicates that both frontal EMG feedback and relaxation training result in significant and often equivalent reductions in headache activity. These reductions are not observed in no-treatment or placebo controls. Combinations of these techniques might result in greater or earlier reductions in certain headache parameters. However, combining

TABLE III. BEHAVIORAL INTERVENTIONS FOR MUSCLE CONTRACTION HEADACHE

Investigator	Technique(s)	Headache outcome[a]
Budzynski, Stoyva, Adler, & Mullaney (1973)	Frontal EMG ($n = 6$) vs. false feedback ($n = 6$) vs. no treatment ($n = 6$)	Frontal EMG, 4/6 significant improvement maintained at 3-month follow-up; false feedback, 1/6 improved; no treatment, no significant improvement
Cox, Freundlich, & Meyer (1975)	Frontal EMG ($n = 9$) vs. progressive relaxation (PR; $n = 9$) vs. placebo medication ($n = 9$)	Equivalent reductions in headache activity in frontal EMG and PR groups only; maintained at 4-month follow-up
Haynes, Griffin, Mooney, & Parise (1975)	Frontal EMG ($n = 8$) vs. taped relaxation (TR; $n = 8$) vs. no treatment ($n = 5$)	Equivalent reductions in headache activity in frontal EMG and TR groups maintained at 5–7-month follow-up; no treatment, no significant improvement
Chesney & Shelton (1976)	Frontal EMG ($n = 6$) vs. relaxation training (RT; $n = 6$) vs. combined EMG and RT ($n = 6$) vs. no treatment ($n = 6$)	All treatment groups reported greater reduction in headache frequency than NTC; combined EMG/RT group and RT greatest reduction in duration of headache; combined group associated with greatest decline in intensity; no follow-up

Study	Design	Results
Hutchings & Reinking (1976)	Progressive relaxation training (PRT; n = 6) vs. frontal EMG feedback (n = 6) vs. combined PRT and EMG feedback (n = 6)	All groups indicated reduction in headache activity; combined treatment and EMG feedback groups reported this reduction earlier; 4-week follow-up indicated that the frontal EMG and combined PRT and EMG groups displayed greater headache improvement than PRT
Kondo & Canter (1977)	Frontal EMG (n = 10) vs. false feedback (n = 10)	Frontal EMG resulted in greater reduction in headache frequency; follow-up not reported
Philips (1977c)	Frontal or temporal EMG feedback (n = 8) vs. false feedback (n = 7) (patients included both MCH and mixed-headache types)	Frontal or temporal EMG feedback group reported greater reduction in headache intensity and medication use 6–8 weeks following treatment
Holroyd, Andrasik, & Westbrook (1977)	Cognitive stress-coping (n = 10) vs. frontal EMG (n = 11) vs. no treatment (n = 10)	Significant improvement in headache activity at posttreatment and 15-week follow-up in stress-coping group only
Holroyd, Andrasik, & Noble (1980)	frontal EMG (n = 10) vs. pseudotherapy control (n = 10) vs. symptom-monitoring control (n = 11)	Frontal EMG group reported significant improvement in headache activity (66% symptom reduction); no significant improvement in the control groups; follow-up at one month indicated that initial treatment gains were maintained or enhanced

This table does not provide data on physiological change associated with treatment. For a more detailed analysis, refer to Beaty and Haynes (1979).

relaxation and EMG feedback does not clearly add to the clinical effects. To our knowledge, there are no investigations of the effects of these procedures with children diagnosed with MCH.

Miscellaneous Approaches

Less frequently reported nonpharmacological approaches to chronic headache include acupuncture (Laitinen, 1975), autoacupressure (Kurland, 1976), and cervical manipulation (Parker, Tupling, & Pryor, 1978). As a consequence of the limited number of studies evaluating the clinical outcome of these procedures, their utility is presently unclear.

Although a small number of reports of the use of cryosurgery (Cook, 1973), differential thermal rhizotomy (Sweet, 1979), and occipital bone removal (Trupp, 1976) have appeared in the past decade, surgery is only rarely used in the treatment of migraine. Nevertheless, it is informative to note that a variety of surgical procedures including sympathectomies of the affected artery (Knight, 1968), ligation of various branches of the common carotid artery (Olivercrona, 1947), and sensory root sectioning of the superficial branches of the trigeminal nerve (Knight, 1968) have resulted in little relief over and above that obtained from pharmacological agents. The lack of any apparent utility of these surgical procedures in eliminating or reducing the headache implicates a more central mechanism for pain in migraine.

Clinical Guidelines

As is often the case in clinical practice, the procedures employed in the treatment of individual cases of headache are frequently without firm empirical support. The decision to use one procedure over another is commonly a question of practicality and/or personal bias. Unfortunately, the lack of convincing evidence for the superiority of one technique or group of techniques over others can function as both barrier and license—preventing clinical trials or allowing for an indiscriminate and uncontrolled application of numerous procedures. Despite this limited empirical justification for treatment decisions, certain guidelines can be offered for the treatment of individual headache cases.

1. There is a need for a comprehensive assessment that should begin in all cases with a thorough medical and neurological examination. In addition to assessing symptomatic status, factors that can influence headache parameters or treatment response should be considered (e.g., familial, occupational, cultural, personality, etc.). Baseline self-monitoring of headache activity is an important assessment ingredient, and in our experience most patients are easily motivated to keep such records given that they are supplied with an explicit rationale and specific guidelines for such observation.

2. At the present time, it is probably advisable to begin most cases with a trial of some form of relaxation training. Simply from a cost–benefit perspective, relaxation, as opposed to other procedures such as biofeedback, is an appropriate first step when one considers such factors as time, therapist training, and instrumentation costs.

3. If the decision is made to use biofeedback, it should be delivered by a clinician familiar with both the psychophysiology of the target response system (e.g., EMG, temporal artery BVP, etc.) and the various biofeedback paradigms that have been devised to promote the learning and generalization of voluntary control. In this mode of therapy, the clinician is also advised to avoid the pitfall of focusing exclusively on psychophysiological variables. Despite the focus of the treatment technique, the therapy as a whole should remain comprehensive.

4. Given that the majority of headache patients use some form of medication, the clinician who employs nonpharmacological treatment procedures should be sensitive to the potential dilemma that these patients may be confronted with (i.e., should I continue to take my pills?). Medication intake and type should be monitored closely, and patients should be discouraged from any abrupt changes. Withdrawals should be controlled and gradual, and, in the case of strong vasoactive drugs, medical consultation is advisable.

5. Attention should be given to potential compliance problems with regard to the continuous use of the self-control strategies. Specific incentives can be introduced systematically, or the scheduling of regular follow-up sessions to monitor the maintenance of whatever gains were made during the course of therapy can be used to reduce compliance problems.

6. If relaxation or biofeedback techniques do not result in a clinically significant change in symptomatology, more direct approaches to modifying pain such as certain hypnotic procedures (e.g., Sachs, Feuerstein, & Vitale, 1977) can assist in the control of the acute attack. If the headaches remain following an approach directed at the pain itself, it is advisable to evaluate once again for depression.

CONCLUSION

Headache is a disorder with perhaps one of the longest histories in the emerging area of behavioral medicine. It was clearly one of the early disorders in which "alternative" forms of therapy arising from behavior therapy were attempted with some success. Over the years, however, with the assistance of the popular media and the desire to exert an impact in this fertile area, a myth has been perpetrated. This myth is the commonly espoused view that behavioral technology exists with a capability of rapidly and completely eradicating chronic headache. As we have indicated, techniques are available that can assist greatly in the management

of headache, but the effects are modest. Clinical improvement is reported more often than complete remission.

Due to the magnitude and complexity of the problem, chronic headache provides a considerable challenge to both clinician and researcher. The challenge for the clinician is in the development of innovative techniques that are actually based on empirically valid biobehavioral mechanisms. From a theoretical perspective, chronic headache provides a model problem for studying the effects of stress on peripheral and central pain mechanisms. As developments emerge from the biobehavioral research conducted in the next decade, and as this research is translated into treatment efforts, the myth referred to above may become a reality.

ACKNOWLEDGMENTS

REFERENCES

Ad hoc committee on classification of headache. *Neurology*, 1962, *12*, 378–380.

Adams, H. E., Feuerstein, M., & Fowler, J. Migraine headache: A review of parameters, theories and interventions. *Psychological Bulletin*, 1980, *87*, 217–237.

Alexander, F. *Psychosomatic medicine.* New York: W. W. Norton, 1950.

Anderson, J. A. D., Basker, M. A., & Dalton, R. Migraine and hypnotherapy. *International Journal of Clinical and Experimental Hypnosis*. 1975, *23*, 48–58.

Andreychuk, T., & Skriver, C. Hypnosis and biofeedback in the treatment of migraine headache. *International Journal of Clinical and Experimental Hypnosis*, 1975, *23*, 172–183.

Anthony, M., Hinterberger, H., & Lance, J. W. Plasma serotonin in migraine and stress. *Archives of Neurology*, 1967, *16*, 544–552.

Anthony, M., Hinterberger, H., & Lance, J. W. The possible relationship of serotonin to the migraine syndrome. *Research and Clinical Studies in Headache*, 1969, *2*, 29–59.

Apesos, J., & Folse, R. Lower extremity arterial insufficiency after long-term methysergide maleate therapy. *Archives of Surgery*, 1979, *114*, 964–967.

Bakal, D. A. Headache: A biopsychological perspective. *Psychological Bulletin*, 1975, *82*, 369–382.

Bakal, D. A. Headache. In R. H. Woody (Ed.), *Encyclopedia of clinical assessment.* San Francisco: Jossey-Bass, 1980.

Bakal, D. A., & Kaganov, J. A. Muscle contraction and migraine headache: A psychophysiological comparison. *Headache*, 1977, *17*, 208–215.

Bassoe, P. Migraine. *Journal of the American Medical Association*, 1933, *101*, 599–605.

Beaty, E. T., & Haynes, S. N. Behavioral intervention with muscle-contraction headache: A review. *Psychosomatic Medicine*, 1979, *41*, 165–180.

Benson, H., Klemchuk, H. P., & Graham, J. R. The usefulness of the relaxation response in the therapy of headache. *Headache*, 1974, *14*, 49–52.

Bild, R., & Adams, H. E. Modification of migraine headaches by cephalic blood volume pulse and EMG biofeedback. *Journal of Consulting and Clinical Psychology*, 1980, *48*, 51–57.

Bille, B. Migraine in school children. *Acta Paediatrica*, 1962, *51*, Supplement 136, 1–151.

Blanchard, E. B., & Miller, S. T. Psychological treatment of cardiovascular disease. *Archives of General Psychiatry*, 1977, *34*, 1402–1413.

Blanchard, E. B., Theobald, D. E., Williamson, D. A., Silver, B. V., & Brown, D. A. Temperature biofeedback in the treatment of migraine headaches. *Archives of General Psychiatry*, 1978, *35*, 581–588.

Blanchard, E. B., Ahles, T. A., & Shaw, E. R. Behavioral treatment of headaches. In M. Hersen, R. M. Eisler, & P. M. Miller (Eds.), *Progress in behavior modification* (Vol. 8). New York: Academic Press, 1979.

Brazil, P., & Friedman, A. P. Further observations in craniovascular studies. *Neurology*, 1957, *7*, 52–55.

Brewis, M., Poskanzer, D. C., Rolland, C., & Miller, H. Neurological disease in an English city. *Acta Neurologica Scandinavica*, 1966, *42*, Supplement 24, 1–89.

Budzynski, T., Stoyva, J., & Adler, C. Feedback-induced relaxation: Application to tension headache. *Journal of Behavior Therapy and Experimental Psychiatry*, 1970, *1*, 205–211.

Budzynski, T., Stoyva, J., Adler, C., & Mullaney, D. EMG biofeedback and tension headache: A controlled outcome study. *Psychosomatic Medicine*, 1973, *35*, 484–496.

Carroll, J. D. Migraine: General management. *British Medical Journal*, 1971, *2*, 756–757.

Chesney, M. A., & Shelton, J. L. A comparison of muscle relaxation and electromyogram biofeedback treatment for muscle-contraction headache. *Journal of Behavior Therapy and Experimental Psychiatry*, 1976, *7*, 221–225.

Childs, A. J., & Sweetnam, M. T. A study of 104 cases of migraine. *British Journal of Industrial Medicine*, 1961, *18*, 234–236.

Clarke, G. J. R., & Waters, W. E. Headache and migraine in a London general practice. In J. N. Cumings (Ed.), *The epidemiology of migraine*. Bracknell: Boehringer Ingelham, 1974.

Cohen, M. J. Psychophysiological studies of headache: Is there similarity between migraine and muscle contraction headaches? *Headache*, 1978, *18*, 189–196.

Cohen, M. J., Rickles, W. H., & McArthur, D. L. Evidence for physiological response stereotypy in migraine headache. *Psychosomatic Medicine*, 1978, *40*, 344–354.

Cook, N. Cryosurgery of migraine. *Headache*, 1973, *12*, 143–150.

Cox, D., Freundlich, A., & Meyer, R. Differential effectiveness of electromyograph feedback, verbal relaxation instructions, and medication placebo with tension headaches. *Journal of Consulting and Clinical Psychology*, 1975, *43*, 892–898.

Curran, D. A., & Lance, J. W. Clinical trial of methysergide and other preparations in the management of migraine. *Journal of Neurology, Neurosurgery and Psychiatry*, 1964, *27*, 463–469.

Curran, D. A., Hinterberger, H., & Lance, J. W. Total plasma serotonin, 5-hydroxy-indoleacetic acid and p-hydroxy-m-methoxymandelic acid excretion in normal and migrainous subjects. *Brain*, 1965, *88*, 997–1010.

Curran, D. A., Hinterberger, H., & Lance, J. W. Methysergide. In A. P. Friedman (Ed.), *Research and clinical studies in headache: An international review* (Vol. 1). New York: Karger, 1967.

Dalessio, D. J. *Wolff's headache and other head pain*. New York: Oxford University Press, 1972.

Dalton, K. Migraine and oral contraceptives. *Headache*, 1976, *16*, 247–251.

Daniels, L. Treatment of urticaria and severe headache by behavior therapy. *Psychosomatics*, 1973, *14*, 347–351.

DeLozier, J. E., & Gagnon, R. O. *National ambulatory medical care survey: 1973 summary, United States, May 1973–April 1974* (DHEW Publication No. HRA 79-1772). Washington, D.C.: U.S. Government Printing Office, 1975.

Dexter, J., & Riley, T. Studies in nocturnal migraine. *Headache*, 1975, *15*, 51–62.

Diamond, S., & Dalessio, D. J. *The practicing physician's approach to headache* (2nd ed.). New York: Medcom Press, 1978.

Diamond, S., & Franklin, M. Biofeedback—choice of treatment in childhood migraine. Paper presented at the seventh annual meeting of the Biofeedback Society of America, Colorado Springs, Colorado, 1976.

Diamond, S., & Medina, J. L. Double blind study of propranolol for migraine prophylaxis. Headache, 1976, 16, 24–27.

Ebbing, H. C. Migräine bei Zwillingen, vorläufige Mitteilung. Acta Genetica Medica, 1956, 5, 371–382.

Edmeads, J. Vascular headache and the cranial circulation: Another look. Headache, 1979, 19, 127–132.

Ely, F. A. The migraine-epilepsy syndrome: A statistical study of heredity. Archives of Neurology and Psychiatry, 1930, 24, 943–949.

Fahrion, S. L. Autogenic biofeedback treatment for migraine. Mayo Clinic Proceedings, 1977, 52, 776–784.

Fanchamps, A. The role of humoral mediators in migraine headache. Canadian Journal of Neurological Sciences, 1974, 1, 189–195.

Feuerstein, M., & Adams, H. E. Cephalic vasomotor feedback in the modification of migraine headache. Biofeedback and Self-Regulation, 1977, 2, 241–254.

Feuerstein, M., & Skjei, E. Mastering pain. New York: Bantam Books, 1979.

Feuerstein, M., Adams, H. E., & Beiman, I. Cephalic vasomotor and electromyographic feedback in the treatment of combined muscle contraction and migraine headaches in a geriatric case. Headache, 1976, 16, 232–237.

Feuerstein, M., Bush, C., & Corbisiero, R. Stress reactivity in chronic headache: An analysis of migraine, mixed and muscle contraction headache. Journal of Psychosomatic Research, in press.

Feuerstein, M., Woo, W., & Zeichner, A. Social skills and chronic headache. Manuscript submitted for publication, 1981.

Fordyce, W. Behavioral methods for chronic pain and illness. St. Louis: Mosby, 1976.

Fowler, R. Operant therapy for headache. Headache, 1975, 15, 63–68.

Friar, L. R., & Beatty, J. Migraine: Management by trained control of vasoconstriction. Journal of Consulting and Clinical Psychology, 1976, 44, 46–53.

Friedman, A. P. Studies in the pharmacotherapy of headache. Neurology, 1963, 13, 27–33.

Friedman, A. P. Drug treatment of migraine. In P. J. Vinken & G. W. Bruyn (Eds.), Handbook of clinical neurology (Vol. 5). Amsterdam: North-Holland, 1968.

Friedman, A. P. Part 1: Migraine headaches. Journal of the American Medical Association, 1972, 222, 1399–1402.

Friedman, A. P. Characteristics of tension headache: A profile of 1,420 cases. Psychosomatics, 1979, 20, 451–458.

Friedman, A. P., & Merritt, H. H. Treatment of headache. Journal of the American Medical Association, 1957, 163, 1111–1117.

Friedman, A. P., Von Storch, T. C., & Merritt, H. H. Migraine and tension headache: A clinical study of 2000 cases. Neurology, 1954, 4, 773–778.

Gainer, J. Temperature discrimination training in the biofeedback treatment of migraine headache. Journal of Behavior Therapy and Experimental Psychiatry, 1978, 9, 185–188.

Gannon, L., & Sternbach, R. A. Alpha enhancement as a treatment for pain: A case study. Journal of Behavior Therapy and Experimental Psychiatry, 1971, 2, 209–213.

Graham, J. R., & Wolff, H. G. Mechanism of migraine headache and action of ergotamine tartrate. Archives of Neurology and Psychiatry, 1938, 39, 737–763.

Graham, W. G. Hypnotic treatment for migraine headaches. International Journal of Clinical and Experimental Hypnosis, 1975, 23, 165–171.

Greenfield, N. S., & Sternbach, R. A. (Eds.). Handbook of psychophysiology. New York: Holt, Rinehart & Winston, 1972.

Hachinski, V., Norris, J. W., Edmeads, J., & Cooper, P. W. Ergotamine and cerebral blood flow. Stroke, 1978, 9, 594–596.

Hanington, E., Horn, M., & Wilkinson, M. Further observations on the effects of tyramine.

In *Background to migraine: Third British migraine symposium.* London: Heinemann, 1970.

Harper, R. G., & Steger, J. C. Psychological correlates of frontalis EMG and pain in tension headaches. *Headache,* 1978, *18,* 215–218.

Harrison, R. H. Psychological testing in headache: A review. *Headache,* 1975, *15,* 177–185.

Harvald, B., & Hauge, M. A catamnestic investigation of Danish twins. *Danish Medical Bulletin,* 1956, *3,* 150–158.

Hay, K. M., & Madders, J. Methods of Management of fatigue and tension. In J. N. Cumings (Ed.), *Background to migraine: Fifth migraine symposium.* New York: Springer-Verlag, 1973.

Haynes, S., Griffin, P., Mooney, D., & Parise, M. Electromyographic biofeedback and relaxation instructions in the treatment of muscle-contraction headaches. *Behavior Therapy,* 1975, *6,* 672–678.

Henryk-Gutt, R., & Reese, W. L. Psychological aspects of migraine. *Journal of Psychosomatic Research,* 1973, *17,* 141–153.

Hilton, B. P., & Cumings, J. N. 5-Hydroxytryptamine levels and platelet aggregation responses in subjects with acute migraine headache. *Journal of Neurology, Neurosurgery and Psychiatry,* 1972, *35,* 505–509.

Hokkanen, E., Waltimo, O., & Kallanranta, T. Toxic effects of ergotamine used for migraine. *Headache,* 1978, *18,* 95–98.

Holroyd, K. A., Andrasik, F., & Westbrook, T. Cognitive control of tension headache. *Cognitive Therapy and Research,* 1977, *1,* 121–133.

Holroyd, K. A., Andrasik, F., & Noble, J. A comparison of EMG biofeedback and a credible pseudotherapy in treating tension headache. *Journal of Behavioral Medicine,* 1980, *3,* 29–39.

Hsu, L. K. G., Crisp, A. H., Kalucy, R. S., Koval, J., Chen, C. N., Carruthers, M., & Zilkha, K. Early morning migraine: Nocturnal plasma levels of catecholamines, tryptophan, glucose and free fatty acids, and sleep encephalographs. *Lancet,* 1977, *1,* 447–450.

Hutchings, D., & Reinking, R. Tension headaches: What forms of therapy is most effective? *Biofeedback and Self-Regulation,* 1976, *1,* 183–190.

Jessup, B. A. The role of diet in migraine: Conditioned taste aversion. *Headache,* 1978, *18,* 229.

Jessup, B. A., Neufeld, R. W. J., & Merskey, H. Biofeedback therapy for headache and other pain: An evaluative review. *Pain,* 1979, *7,* 225–270.

Johnson, E. S. A basis for migraine therapy: The autonomic theory reappraised. *Postgraduate Medical Journal,* 1978, *54,* 231–242.

Johnson, W. G., & Turin, A. Biofeedback treatment of migraine headache: A systematic case study. *Behavior Therapy,* 1975, *6,* 394–397.

Kentsmith, D., Strider, F., Copenhaver, J., & Jacques, D. Effects of biofeedback upon suppression of migraine symptoms and plasma dopamine-β-hydroxylase activity. *Headache,* 1976, *16,* 173–177.

Keys, A., Aravanis, C., Blackburn, H., van Buchern, F. S. P., Buzina, R., Djordjevic, B. S., Fidanza, F., Karvonen, M. J., Menotti, A., Puddu, V., & Taylor, H. L. Probability of middle-aged men developing coronary heart disease in five years. *Circulation,* 1972, *45,* 815–828.

Kimball, R. W., Friedman, A. P., & Vallejo, E. Effect of serotonin in migraine patients. *Neurology,* 1960, *10,* 107–111.

Knight, G. Surgical treatment of migraine. In P. J. Vinken & G. W. Bruyn (Eds.), *Handbook of clinical neurology.* Amsterdam: North-Holland, 1968.

Kondo, C., & Canter, A. True and False electromyographic feedback: Effect on tension headache. *Journal of Abnormal Psychology,* 1977, *86,* 93–95.

Kroger, W. S. Hypnotherapeutic management of headache. *Headache,* 1963, *3,* 50–62.

Kudrow, L. The relationship of headache frequency to hormone use in migraine. *Headache,* 1975, *15,* 36–40.

Kudrow, L. Hormones, pregnancy and migraine. In O. Appenzeller (Ed.), *Pathogenesis and treatment of headache*. New York: Spectrum, 1976.

Kungasniemi, P., Riekkinen, P., Rinne, U. K. Kallikrein-like esterase and peptidase activities in CSF during migraine attacks and free intervals. *Headache*, 1972, *12*, 66–68.

Kurland, H. D. Treatment of headache pain with auto-acupressure. *Diseases of the Nervous System*, 1976, *37*, 127–129.

Laitinen, J. Acupuncture for migraine prophylaxis: A prospective clinical study with six month's follow-up. *American Journal of Chinese Medicine*, 1975, *3*, 271–274.

Lambley, P. The use of assertive training and psychodynamic insight in the treatment of migraine headache: A case study. *Journal of Nervous and Mental Disease*, 1976, *163*, 61–64.

Lance, J. W. *Mechanism and management of headache* (3rd ed.). London: Butterworth, 1978.

Lance, W. J., & Anthony, M. Some clinical aspects of migraine: A prospective survey of 500 patients. *Archives of Neurology*, 1966, *15*, 356–361.

Lance, J. W., & Curran, D. A. Treatment of chronic tension headache. *Lancet*, 1964, *1*, 1236–1243.

Lennox, M. Febrile convulsions in childhood. *Research Publications of the Association for Research of Nervous and Mental Disorders*, 1947, *26*, 342–365.

Lindhardt, M. *The sickness survey of Denmark: 1951–1954*. Copenhagen: Munksgaard, 1960.

Loughry-Machado, G., & Suter, S. *Skin temperature biofeedback in children and their parents*. Paper presented at the tenth annual meeting of the Biofeedback Society of America, San Diego, 1979.

Lucas, R. N., & Falkowski, W. Ergotamine and methysergide abuse in patients with migraine. *British Journal of Psychiatry*, 1973, *122*, 199–203.

Malmo, R. B., & Smith, A. A. Forehead tension and motor irregularities in psychoneurotic patients under stress. *Journal of Personality*, 1955, *23*, 391–406.

Malvea, B. P., Gwon, N., & Graham, J. R. Propranolol prophylaxis of migraine. *Headache*, 1973, *12*, 163–167.

Markush, R. E., Karp, H. R., Heyman, A., & O'Fallon, W. M. Epidemiologic study of migraine symptoms in young women. *Neurology*, 1975, *25*, 430–435.

Martin, M. J. Muscle contraction headache. *Psychosomatics*, 1972, *13*, 16–19.

Martin, J. J., Rome, H. P., & Swenson, W. M. Muscle contraction headache: A psychiatric review. *Research and Clinical Studies in Headache*, 1967, *1*, 187–204.

Mathew, N. T., Hrastnik, F., & Meyer, J. S. Regional cerebral blood flow in the diagnosis of vascular headache. *Headache*, 1976, *15*, 252–260.

Medina, J. L., & Diamond, S. Migraine and atopy. *Headache*, 1976, *15*, 271–274.

Medina, J. L., & Diamond, S. Drug dependency in patients with chronic headache. *Headache*, 1977, *17*, 12–14.

Medina, J. L., & Diamond, S. The role of diet in migraine. *Headache*, 1978, *18*, 31–34.

Medina, J. L., Diamond, S., & Franklin, M. A. Biofeedback therapy for migraine. *Headache*, 1976, *16*, 115–118.

Melzack, R. *The puzzle of pain*. New York: Basic Books, 1973.

Mitch, P. S., McGrady, A., & Iannone, A. Autogenic feedback training in migraine: A treatment report. *Headache*, 1976, *16*, 267–270.

Mitchell, K. R., & Mitchell, D. M. Migraine: An exploratory treatment application of programmed behavior therapy techniques. *Journal of Psychosomatic Research*, 1971, *15*, 137–157.

Mitchell, K. R., & White, R. G. Behavioural self-management: An application to the problem of migraine headaches. *Behavior Therapy*, 1977, *8*, 213–222.

Moffett, A., Swash, M., & Scott, D. F. Effect of tyramine in migraine: A double-blind study. *Journal of Neurology, Neurosurgery and Psychiatry*, 1972, *35*, 496–499.

Moffett, A., Swash, M., & Scott, D. F. Effect of chocolate in migraine: A double-blind study. *Journal of Neurology, Neurosurgery and Psychiatry*, 1974, *37*, 445–448.

Morrell, D. C. Symptom interpretation in general practice. *Journal of the Royal College of General Practitioners*, 1972, *22*, 297–309.

Mullinix, J. M., Norton, B. J., Hack, S., & Fishman, M. A. Skin temperature biofeedback and migraine. *Headache*, 1978, *18*, 242–244.

Nikiforow, R., & Hokkanen, E. An epidemiological study of headache in an urban and a rural population in Northern Finland. *Headache*, 1978, *18*, 137–145.

Nikiforow, R., & Hokkanen, E. Effects of headache on working ability: A survey of an urban and a rural population in Northern Finland. *Headache*, 1979, *19*, 214–218.

O'Brien, M. D. Cerebral cortex perfusion rates in migraine. *Lancet*, 1967, *1*, 1036.

Ogden, H. O. Headache studies. Statistical data. II: Headache patterns. *Journal of Allergy*, 1952, *23*, 458–464.

Oleson, J. Some clinical features of the acute migraine attack: An analysis of 750 patients. *Headache*, 1978, *18*, 268–271.

Olivercrona, H. Notes on the surgical treatment of migraine. *Acta Medica Scandinavica, Supplementum*, 1947, *196*, 229–238.

Ostfeld, A. M., Reis, D. J., & Wolff, H. G. Studies on headache: Bulbar conjunctival ischemia and muscle contraction headache. *Archives of Neurology and Psychiatry*, 1957, *77*, 113–119.

Parker, G. B., Tupling, H., & Pryor, D. S. A controlled trial of cervical manipulation for migraine. *Australian and New Zealand Journal of Medicine*, 1978, *8*, 589–593.

Paulley, J. W., & Haskell, D. A. L. The treatment of migraine without drugs. *Journal of Psychosomatic Research*, 1975, *19*, 367–374.

Philips, C. Headache and personality. *Journal of Psychosomatic Research*, 1976, *20*, 535–542.

Philips, C. Headache in general practice. *Headache*, 1977, *16*, 322–329. (a)

Philips, C. A psychological analysis of tension headache. In S. Rachman (Ed.), *Advances in medical psychology*. Oxford: Pergamon, 1977. (b)

Philips, C. The modification of tension headache pain using EMG biofeedback. *Behavior Research and Therapy*, 1977, *15*, 119–129. (c)

Philips, C. Tension headache: Theoretical problems. *Behavior Research and Therapy*, 1978. *16*, 249–261.

Price, K. P., & Tursky, B. Vascular reactivity of migraineurs and non-migraineurs: A comparison of responses to self-control procedures. *Headache*, 1976, *16*, 210–217.

Rachman, S., & Philips, C. *Psychology and medicine*. London: Temple Smith, 1975.

Reeves, J. *EMG-biofeedback reduction of tension headache: A cognitive skills training approach.* Paper presented at the sixth annual meeting of the Biofeedback Research Society, Monterey, Calif.: 1975.

Refsum, S. Genetic aspects of migraine. In P. J. Vinken and G. W. Bruyn (Eds.), *Handbook of clinical neurology* (Vol. 5). Amsterdam: North Holland, 1968.

Rolf, L. H., Wiele, G., & Brune, G. G. Serotonin in platelets of patients with migraine and muscle contraction headache. *Excerpta Medica*, 1977, *427*, 11–12.

Sachs, L. B., Feuerstein, M., & Vitale, J. H. Hypnotic self-regulation of chronic pain. *American Journal of Clinical Hypnosis*, 1977, *20*, 106–113.

Sainsbury, P., & Gibson, J. G. Symptoms of anxiety and tension and the accompanying physiological changes in the muscular system. *Journal of Neurology, Neurosurgery and Psychiatry*, 1954, *17*, 216–224.

Sakai, F., & Meyer, J. S. Regional cerebral hemodynamics during migraine and cluster headaches measured by the ^{133}Xe inhalation method. *Headache*, 1978, *18*, 122–132.

Sakai, F., & Meyer, J. S. Abnormal cerebrovascular reactivity in patients with migraine and cluster headache. *Headache*, 1979, *19*, 257–266.

Sandler, M., Youdim, M. B. H., & Hanington, E. A phenylethylamine oxidasing defect in migraine. *Nature*, 1974, *250*, 335–337.

Sargent, J. D., Green, E. E., & Walters, E. D. Preliminary report on the use of autogenic feedback training in the treatment of migraine and tension headaches. *Psychosomatic Medicine*, 1973, *35*, 129–135.

Sargent, J. D., Walters, E. D., & Green, E. E. Psychosomatic self-regulation of migraine headaches. *Seminars in Psychiatry*, 1973, 5, 415–428.

Schultz, J., & Luthe, W. *Autogenic training: A psychophysiological approach to psychotherapy*. New York: Grune & Stratton, 1959.

Schumacher, G. A., & Wolff, H. G. Experimental studies on headache: Contrast of histamine headache with headache of migraine and that associated with hypertension. *Archives of Neurology and Psychiatry*, 1941, 45, 199–206.

Selby, G., & Lance, J. W. Observations on 500 cases of migraine and allied vascular headache. *Journal of Neurology, Neurosurgery and Psychiatry*, 1960, 23, 23–32.

Shaw, S. W. J., Johnson, R. H., & Keogh, H. J. Oral tyramine in dietary migraine sufferers. In R. Greene (Ed.), *Current concepts in migraine research*. New York: Raven Press, 1978.

Sicuteri, F. Monoamine supersensitivity in non-organic pain (idiopathic headache). *Exerpta Medica*, 1977, 427, 194–199.

Sicuteri, F. Endorphins, opiate receptors and migraine headache. *Headache*, 1978, 17, 253–256.

Sicuteri, F., Testi, A., & Anselmi, B. Biochemical investigations in headache: Increase in hydroxyindoleacetic acid excretion during migraine attacks. *International Archives of Allergy and Applied Immunology*, 1961, 19, 55–58.

Sicuteri, F., Anselmi, B., & Fanciullacci, M. The serotonin (5-HT) theory of migraine. *Advances in Neurology*, 1974, 4, 383–394.

Sillanpää, M. Prevalence of migraine and other headache in Finnish children starting school. *Headache*, 1976, 15, 288–290.

Silver, B. V., & Blanchard, E. B. Biofeedback and relaxation training in the treatment of psychophysiological disorders: Or are the machines really necessary? *Journal of Behavioral Medicine*, 1978, 1, 217–239.

Skinhøj, E., & Paulson, O. B. Regional blood flow in internal carotid distribution during migraine attacks. *British Medical Journal*, 1969, 3, 569–570.

Sokolov, E. N. *Perception and the conditioned reflex*. New York: Pergamon, 1963.

Stamler, J., Berkson, D. M., Dyer, A., Lepper, M. H., Lindberg, H. A., Oglesby, P., McKean, H., Rhomberg, P., Schoenberger, J. A., Shekelle, R. B., & Stamler, R. Relationship of multiple variables to blood pressure: Findings from four Chicago epidemiologic studies. In O. Paul (Ed.), *Epidemiology and control of hypertension*. New York: Intercontinental Medical Book Corp., 1975.

Sternbach, R. A. *Pain patients: Traits and treatments*. New York: Academic Press, 1974.

Sternbach, R. A. (Ed.). *The psychology of pain*. New York: Raven Press, 1978.

Sturgis, E. T., Tollison, C. D., & Adams, H. E. Modification of combined migraine-muscle contraction headaches using BVP and EMG feedback. *Journal of Applied Behavior Analysis*, 1978, 11, 215–223.

Sulman, F. G., Levy, D., Lewy, A., Pfeifer, Y., Superstine, E., & Tal, E. Air-ionometry of hot, dry desert winds (sharav) and treatment with air ions of weather-sensitive subjects. *Journal of International Biometeorology*, 1974, 18, 313–318.

Sweet, W. *Neurosurgical approaches to facial pain*. Paper presented at the 21st meeting of the Association for the Study of Headache, Boston, 1979.

Trupp, M. Head pain: Congenital, anatomical, pathological and neurosurgical correlates. *Headache*, 1976, 16, 243–246.

Tunis, M. M., & Wolff, H. G. Studies on headache: Long-term observations of the reactivity of the cranial arteries in subjects with vascular headache of the migraine type. *Archives of Neurology and Psychiatry*, 1953, 70, 551–558.

Tunis, M. M., & Wolff, H. G. Studies on headache: Cranial artery vasoconstriction and muscle contraction headache. *Archives of Neurology and Psychiatry*, 1954, 71, 425–434.

Turin, A., & Johnson, W. G. Biofeedback therapy for migraine headaches. *Archives of General Psychiatry*, 1976, 33, 517–519.

Turner, D. B., & Stone, A. J. Headache and its treatment: A random survey. *Headache*, 1979, 19, 74–77.

Vahlquist, B. Migraine in children. *International Archives of Allergy*, 1955, 7, 348–355.

van Boxtel, A., & Roozeveld van der Ven, J. Differential EMG activity in subjects with muscle contraction headaches related to mental effort. *Headache*, 1978, 17, 233–237.

Vaughn, R., Pall, M. L., & Haynes, S. N. Frontalis EMG response to stress in subjects with frequent muscle contraction headaches. *Headache*, 1977, 16, 313–317.

Walker, C. H. Migraine and its relationship to hypertension. *British Medical Journal*, 1959, 2, 1430–1433.

Waters, W. E. Epidemiological aspects of migraine. In J. N. Cumings (Ed.), *Background to migraine*. London: Heinemann, 1971.

Waters, W. E., & O'Connor, P. J. Epidemiology of headache and migraine in women. *Journal of Neurology, Neurosurgery and Psychiatry*, 1971, 34, 148–153.

Waters, W. E., & O'Connor, P. J. Prevalence of migraine. *Journal of Neurology, Neurosurgery and Psychiatry*, 1975, 38, 613–616.

Waters, W. E., Koresko, R. L., Rossie, G. V., & Hackley, S. A. Short-, medium-, and long-term relationships among meteorological and electrodermal variables. *Psychophysiology*, 1979, 16, 445–451.

Weber, R. B., & Reinmuth, O. M. The treatment of migraine with propranolol. *Neurology*, 1972, 22, 366–369.

Weiner, H. *Psychobiology and human disease*. New York: Elsevier, 1977.

Weinstock, S. A. A tentative procedure for the control of pain: Migraine and tension headaches. In D. A. Shapiro, T. X. Barber, L. V. DiCara, J. Kamiya, N. E. Miller, & J. Stoyva (Eds.), *Biofeedback and self-control: 1972*. Chicago: Aldine, 1973.

Weisenberg, M. Pain and pain control. *Psychological Bulletin*, 1977, 84, 1008–1044.

Weisenberg, M., & Tursky, B. *Pain: New perspectives in therapy and research*. New York: Plenum Press, 1976.

Welch, K. M. A., Chabi, E., Nell, J., Bartosh, K., Meyer, J. S., & Mathew, N. T. Similarities in biochemical effects of cerebral ischemia in patients with cerebrovascular disease and migraine. In R. Greene (Ed.), *Current concepts in migraine research*. New York: Raven Press, 1978.

Werbach, M. R., & Sandweiss, J. H. Peripheral temperatures of migraineurs undergoing relaxation training. *Headache,* 1978, 18, 211–214.

Werder, D. S. *An exploratory study of childhood migraine using thermal biofeedback as a treatment alternative*. Paper presented at the ninth annual meeting of the Biofeedback Society of America, Albuquerque, New Mexico, 1978.

Whitty, C. W. M., Hockaday, J. M., & Whitty, M. M. The effect of oral contraceptives on migraine. *Lancet*, 1966, 1, 856–859.

Wickramasekera, I. Temperature feedback for the control of migraine. *Journal of Behavior Therapy and Experimental Psychiatry*, 1973, 4, 343–345.

Widerøe, T., & Vigander, T. Propranolol in the treatment of migraine. *British Medical Journal*, 1974, 29, 699–701.

Wilkinson, M., & Woodrow, J. Migraine and weather. *Headache*, 1979, 19, 375–378.

Wooley, S. C., Blackwell, B., & Winget, C. A learning theory model of chronic illness behavior: Theory, treatment and research. *Psychosomatic Medicine*, 1978, 40, 379–401.

Ziegler, D. K. The epidemiology and genetics of migraine. *Research and Clinical Studies in Headache*, 1978, 5, 21–33.

Ziegler, D. K., Hassanein, R., & Hassanein, K. Headache syndromes suggested by factor analysis of symptom variables in a headache prone population. *Journal of Chronic Disease*, 1972, 25, 353–363.

Ziegler, D. K., Hassanein, R. S., Harris, D., & Stewart, R. Headache in a non-clinic twin population. *Headache*, 1975, 14, 213–218.

Behavior Control of Seizure Disorders

DAVID I. MOSTOFSKY AND MARTIN Y. IGUCHI

Epilepsy (or, more accurately, "the epilepsies") is not a disease. It is a multifactoral disorder in which seizures—electrical and clinical—are the most dramatic manifest symptom and the most destructive to personal functioning. The medical management of a person with epilepsy requires a comprehensive program that considers electroencephalogram (EEG) data, underlying organic lesions or pathology, tolerance and effectiveness of anticonvulsant medication, adjunctive behavior therapeutics, and social and personal habilation. Admittedly, if the seizure problem could be eliminated, the remaining problems involved with epilepsy would be trivial, at most. But the goal is decidedly not to treat the EEG and not to control seizures at all costs (even if such a possibility were always pres ent). Behavioral medicine offers a perspective that permits the design of multifactoral interventions to meet the diverse challenges presented by the patient with epilepsy. This chapter will restrict its focus to adjunctive treatment tactics that do not require nutritional, pharmacological, or surgical procedures. The epileptology literature is vast, and the interested reader is well advised to consult this body of knowledge for a broader and more detailed appreciation of the historical, medical, and psychosocial aspects of this topic.

MEDICAL CONSIDERATIONS

Seizures are paroxysmal events. They are self-limiting, usually lasting no more than 1.5 minutes, although an excited observer might insist

DAVID I. MOSTOFSKY and MARTIN Y. IGUCHI • Department of Psychology, Boston University, Boston, Massachusetts 02215.

that they last longer. Depending on the site of the electrical discharge, the seizure will be noticed as a change or interruption of motor, sensory, cognitive, or conscious functions. The damage caused by seizure disorders is not restricted to epidemiological concerns, affecting some 2 million people in the United States at an estimated cost of $2 billion for care, but is better appreciated by the suffering of those afflicted with the disorder: pain brought about by exclusion from a normal social and familial life, the stigma of pills, the days missing from work or school, the loss of the right to drive, and the sense of helplessness. Traditional psychotherapy, rehabilitation counseling, and other allied vocational and mental health support specialists are necessary members of a team concerned with the comprehensive management of the epilepsies (Mostofsky, 1978). The importance of behavioral medicine for this problem is that it can provide preventive and abortive possibilities and reinstate some measure of controllability when drug regimens fail and other traditional medical interventions are inapplicable. Behavioral treatments offer relatively risk-free and optimistic outcomes for positive change. The differential selection among the varieties of treatments remains to be better understood. Conventional assessment batteries have proved to be of only limited value, although the general relationship of psychodiagnostic instruments to epilepsy is receiving increased attention (Balaschak & Mostofsky, 1981).

The major behavioral medicine contributions can be seen as adaptations and extensions of behavior modification, psychotherapy, and biofeedback as adjunctive treatment alternatives for seizure control that have only recently begun to receive careful attention. Although neurologists have been aware of environmental correlations with seizure problems (both positive and negative), few attempts have been made to contrive environmental conditions that might be of clinical value to the person with epilepsy. In retrospect, this neglect is quite understandable, given that the traditional neurological assessment of the seizure disorder commonly excluded the possible contribution of a learned component in the generation and maintenance of the disorder and consequently excluded the need to consider introducing extinction, counterconditioning, stimulus control, or similar learning mechanisms in a comprehensive treatment program. Similarly, psychological therapies in general were thought to be limited to hysterical or other "mental health" conditions. But there is increasing evidence that behavioral treatment programs can offer substantial relief to the epileptic patient and need not be restricted to the mental health sequelae of the disorder, retarded populations, or seizures that are of undisputed psychogenic origin or follow a classic temporal lobe (TLE) profile. Rather, the argument advanced is that some undefined proportion of the variance in seizure severity, frequency, or duration can be modified by an effective behavioral intervention program. This assertion is supported by the data derived from treatments carried out with various patient classifications, including those refractory

to medication or for whom the asymptotic level of control remains unacceptable. In the remaining sections of this chapter, we will attempt to sketch the major avenues of behavioral treatments that can be used and suggest how the practice of neurology can most profitably employ such procedures with the epilepsies.

VARIETIES OF TREATMENT STRATEGIES

A comprehensive review of the published literature describing behavioral treatment applications to seizure disorders has appeared elsewhere (Mostofsky & Balaschak, 1977). The common denominator among the different reports is that the particular procedure used is, in general, a known and accepted tactic for changing "behavior" usually encountered in the context of classroom activities or general behavior management (i.e. positive reinforcement, extinction, punishment, etc.). The necessary requirements for the adaptation the particular procedure to the seizure problem are relatively trivial, given that the therapist has a competent control of the behavioral methodology and a comfortable familiarity with the nature of the epilepsies. The premise underlying the various behavioral procedures is that seizures can be regarded as "another kind of behavior" that will be responsive to environmental contingencies and, further, that judiciously selected, newly learned behaviors in the patient's repertoire can be sufficiently strong and permanent to provide a reduction of seizures. This reduction will result either by extinction of seizure "behavior" or because engaging in the newly acquired skills will prove to be incompatible and mutually exclusive with provoking or allowing the development of epileptic seizures.

The behavioral protocols available for seizure management cluster into three major groups: (1) reinforcement management, (2) self-control, and (3) psychophysiological methods. In practice, a given protocol will often be seen to contain features that could legitimately fall into another category, and, indeed, a given protocol might consist of a number of separate phases and operations. The attempt to bring the behavioral treatment approaches under such a categorization scheme is at best an attempt to introduce some relatively simple order for the uninformed. It is intended to contribute to an appreciation of styles and sensitivities rather than to provide any firm or final description of the theory or dynamics that might explain the effectiveness of the approaches.

Reinforcement Management

Reinforcement management techniques are designed to address the seizure problem from the same point of view as the attempts to alter any other learned behavior. From replicable and solid experience, learning specialists argue that if reinforcement is administered or made accessible

following the execution of some behavior, the probability is increased that the behavior in question will be "strengthened," that is, will reappear within a shorter latency, be emitted more frequently, and become part of the performing repertoire with some degree of permanence. If, however, the behavior is not reinforced, the predicted outcomes are reversed.

The assumptions in the case of epileptic seizures are based in part on the speculation that some proportion of seizure activity is learned. This does not suggest that it is voluntary or hysterical but rather than under specified conditions where reinforcement for seizures is available (secondary gain; socially acceptable "acting out"; avoidance of or escape from stress, punishment, or discomfort), they tend to recur and, in the course of their emission, are actually "strengthened" by subsequent consequences. As with learned behaviors in general, such a position can be accommodated with the physiological context in which the electrical paroxysmal events accompany the clinical expression. There is nothing that contradicts the role of organicity, nor do any of the data from the realm of the pathophysiology of the epilepsies deny the possible effectiveness of learning and conditioning mechanisms.

The reinforcement management procedures rely on the judicious introduction, elimination, and timing of reinforcements (both positive and negative) to effect appropriate learning. The learning goal in question can be focused on teaching the patient to efficiently discriminate environmental conditions that have a demonstrated correlation with seizures and to then cope with those conditions without producing a seizure. Environmental conditions, as used in this context, include subtle private, covert, sensory, or other physiological or nonverbal activities. Learning can also occur without the patient being able to report awareness of personal change, even though environmental consequences have been rearranged so they will not fortuitously provide undesired reinforcement. Often the learning objective will be to introduce a behavioral response in the patient's repertoire that, when sufficiently rehearsed and reinforced, will be able to compete with and exclude a seizure response. Properly selected, such a desired behavior will be mutually exclusive with seizures. The final result will be a diminution of seizures that is attributable to replacing the prepotent seizure behaviors rather than to attenuating or extinguishing seizure processes directly. The latter, however, might also comprise a legitimate behavior modification effort and would exploit the role of counterconditioning as a means to neutralize trigger mechanisms leading to seizures and seizure-generating systems themselves.

As with any operant conditioning or behavior therapy procedure, the specific features of a treatment program are dictated by the unique character of the patient and his or her life space. For a child, reinforcement can take the form of money or a special privilege, for an adolescent, perhaps the ultimate reduction of medication, and for an adult, employment or improvement in family living. These procedures do not appear to be selectively attractive or, conversely, selectively less preferable for any

subgroups or for epileptics differentiated by sex, diagnosis, and cognitive or intellectual potency.

The variety of clients, settings, and treatment techniques utilizing reinforcement conditions is broad (Mostofsky & Balaschak, 1977). A relatively simple application was undertaken in a sheltered day center with a retarded male adult having generalized seizures with complex symptomatology. The patient (suffering seizure disorders attributed to a confirmed inoperable tumor and enlarged ventricles) was praised at regular intervals when seizures did not occur. When a seizure developed, he was given no attention or display of concern, and, although he would generally become incontinent, he alone was responsible for caring for his change of clothes. After about 2 weeks, a 50% reduction of seizures was noted, and with continuation of the program (28 weeks) seizures were reduced to 67% of their pretreatment level (including 13 weeks of no seizures and 6 weeks with no more than a single episode). Such a program relied on denying reinforcement, in any form, on the occurrence of a seizure coupled with the overt administration of reinforcement (praise) for desired (no seizure) behavior (Flannery & Cautela, 1973). Other programs have incorporated penalties, (Adams, Klinge, & Keiser, 1973), time-out from ongoing activities (or pleasurable surroundings) (Iwata & Lorentzson, 1976), relief or termination from uncomfortable consequences of seizures (Ounsted, Lee, & Hutt, 1966), punishment on the occurrence of seizures (Wright, 1973), and covert administration of reinforcement and punishment (via training of imagined events) (Daniels, 1975). In our own work, we have met with some success in establishing a "contract" program with patients stipulating that if an agreed-upon minimum number of seizures occur in any week, some valued consequence decided on by both patient and parent will be forthcoming. In this case, the patient provides his or her own technique for seizure control and the consequences are reinforced, not with each occurrence but on the cumulation of desired behaviors distributed over a longer time.

Success with reinforcement management programs is often reported anecdotally. However, only a limited number of quality research studies exist (largely due to the practical difficulties of properly carrying out idealized and methodologically sound investigations in this area). Granting the reliability of such reports, it would be presumptuous to ascribe major behavioral and biobehavioral alterations solely to the single reinforcement or punishment conditions selected in the treatment protocol. When patient improvement does result, it is likely to be better understood in the countless other conditions of the patient's life space that have benefited from the "multiplier effect" that originated with the objectives of the experimental treatment. Assume that some arrangement of reinforcement conditions is effective in bringing about a meaningful reduction of seizure frequency. With this outcome, the patient's personal and interpersonal functioning may simultaneously improve, and a host of other unprogrammed sources of "rewards" enter (self-esteem, peer interaction, job opportunity, etc.). It is the collection of the various compo-

nents contributing to the reinforcement of nonseizure behavior that may ultimately be deserving of credit for both the acquisition and maintenance of health behaviors, rather than a simplistic attribution of control mechanisms via the limited therapy program alone. Such issues are important to recognize in the formulation of theory in this area. However, the essential message for the practicing clinician is that a confident body of data points to the utility of incorporating the learning-reinforcement prototype of behavior modification into the comprehensive medical management of the epilepsies.

Self-Control

The treatment styles included in this category are designed to effect control of behavior via intrapersonal processes. Indeed, one of the mainstreams among the behavior therapies is cognitive behavior therapy (see Chapter 3 in this volume), a system that conceptually, philosophically, and procedurally differs from the more orthodox operant behavior therapy (see Chapter 2 in this volume). Cognitions, self-control, coping, and similar mediating behaviors are regarded as the critical operative variables in bringing about necessary changes. The practical translation of this approach ranges from relatively simple training in relaxation exercises (with or without biofeedback devices) and stress reduction to the various forms of behavior therapy. The patient is directed to monitor his or her thought processes and emotional states, to appreciate on a rational level the role of conflicts and anxieties, and to deal appropriately with situations that are suspected of being provocative, threatening, or catalytic in precipitating seizures. Recent reports (e.g., Muthen, 1978) have suggested successful results in seizure management among patients who cannot report prodromal or aura symptoms (including petit mal conditions) as well as among those who verbally report an ability to initiate "thought stopping" or other self-control techniques in time to prevent a developing seizure. A most interesting application of a technique representative of this class of behavior modification was reported by Feldman and Paul (1976). The patient was videotaped during an otherwise conventional psychotherapy session during which she experienced a seizure. Replay of the tape to the patient, accompanied by the therapist's interpretation and guiding, enabled a reconstruction of the contextual dialogue, and its clinical significance, that might have contributed to triggering the seizure and that would otherwise not have been available as a conscious event.

More recently, Williams (1979) has completed a study with 37 patients in which psychogenic and neurogenic mechanisms could reasonably account for uncontrollable seizures. By judicious selection of patients (normal IQ, nonpsychotic, etc.), the effectiveness of a traditional psychotherapeutic procedure was striking and impressive in substantially reducing or eliminating the seizure problem.

The gains achieved by self-control techniques have, in the past, been largely utilized to deal with mental health sequelae of epilepsy but have been applied only insignificantly in attempts to reduce the seizure problem itself. The techniques are, indeed, effective in providing clinical support for broad range of health-related goals, including life-style adjustment, coping with the difficulties attending a chronic disorder, and compliance with drugs and other medical orders. Above all, the techniques are most effective in stress reduction and the elimination of anxiety, the latter long regarded as an important variable by psychiatric and neurological epileptologists. Anxiety can be viewed as a diffuse but serious intruder among the contraindications for an epileptic, although an acceptable scientific understanding of anxiety is yet to be formulated; it is important, however, to give some consideration to its mode of action in exacerbating seizures among patients in whom the background pathophysiological system is ever present. Although only sparse empirical data can be offered in support of theoretical speculations, Mostofsky (1978) recently proposed at least four mechanisms that might reasonably account for the anxiety effects that provoke seizures: (1) direct physiochemical change, (2) indirect neurophysiological modulation; (3) psychophysiological modulation; and (4) schedule-induced effects.

Psychophysiological Methods

The techniques represented in this category are of two forms. The first is psychophysical habituation to critical parameters of a physical stimulus known to trigger a seizure (e.g., light or sound frequency, intensity, etc.). These procedures have been extensively studied by Forster (1978) and require long and repeated exposure to the stimuli as they are presented from subthreshold levels through the range of (now extinguished or habituated) suprathreshold values. Despite the limitations that these procedures entail, they are probably the treatments of choice for patients in which the trigger is clearly demarcated in an external physical stimulus. The incidence of such idiosyncratic disorders, and consequently the applicability of the techniques, accounts for only a very small fraction of the epileptic population (e.g., those for whom seizures result from being startled, from photosensitive, or musicogenic).

A second category of psychophysiological procedures is cortical biofeedback, which attempts to provide "anticonvulsant" treatment in epilepsy. Because of the increasing visibility this research enjoys, we will discuss it in greater detail.

Biofeedback and Epilepsy

Although numerous studies have demonstrated that electrocortical activity can be modified within the biofeedback paradigm (Finley, Smith, & Etherton, 1975; Kuhlman, 1978; Lubar & Bahler, 1976; Sterman,

Goodman, & Kovalesky, 1978; Wyrwicka & Sterman, 1968), a reevaluation of the current data is clearly essential (Kaplan, 1975; Kuhlman, 1978; Kuhlman & Kaplan, 1975; Lockard, Wyler, Finch, & Hurlburt, 1977). The importance of such an evaluation is obviously enhanced when considering the use of EEG biofeedback in the realm of behavioral medicine and the control of epileptic seizures. In this discussion, the EEG biofeedback paradigm will be approached in terms of (1) its history of development; (2) its treatment methods (or modes) and efficacy; and (3) a discussion of mechanisms and the possible integration of other areas of research.

History: Animal Studies. Research in the area of seizure control through biofeedback developed out of the original work by Sterman and his associates. Their studies demonstrated that cats could be operantly trained with food reward to increase or decrease a rhythmic 12–16 Hz activity that they called the sensorimotor rhythm or SMR (Roth, Sterman, & Clemente, 1967). Sensorimotor rhythm was described as occurring in brief trains, having a similar appearance to sleep spindles, and was finally localized over the somatosensory cortex (Howe & Sterman, 1972). It is believed that the electrophysiological origin of SMR might be in the ventrobasal nuclei of the thalamus, but numerous areas of the somatosensory and motor areas have also been implicated (Harper & Sterman, 1972; Howe & Sterman, 1973).

Behaviorally, the SMR-trained animals seemed to be more alert, demonstrated a decrease in both tonic and phasic motor activity, showed characteristic "postures," and showed specific changes in the sleep state. Those changes included an increase in sleep spindle bursts during the stage two slow-wave sleep, fewer motor interruptions of sleep, and a decrease in overall sleep time (Howe & Sterman, 1972; Lucas & Sterman, 1974; Roth *et al.*, 1967; Shouse and Sterman, 1979). Concomitant decreases in electromyogram (EMG) and heart rate and an increase in respiratory stability have also been found (Chase & Harper, 1971). It has also been noted that movement blocks SMR and that restrained animals produce an SMR-like pattern (Bouyer, Dedet, Debray, & Rougeul, 1978; Bowersox, Siegel, & Sterman, 1977; Holcome, Sterman, Goodman & Fairchild, 1977).

Of most importance however, was the demonstration that SMR-trained animals were highly resistant to seizures induced by monomethylhydrazine (MMH). In both cats (Sterman, LoPresti, & Fairchild, 1969) and monkeys (Sterman *et al.*, 1978), latency to generalized seizures was significantly enhanced, there were fewer total seizures, and the animals seemed to experience a milder prodrome than controls.

Sterman *et al.* (1978) attempted to train four rhesus monkeys to acquire the SMR response by feeding the left hemisphere EEG signal from midlateral bipolar electrodes into a logic circuit. The logic circuit contained analog bandpass filters with a sharp db rolloff, which determined the delivery of reinforcement in the form of a pellet to the animal. Reinforcement criterion was a minimum of one-half second of 12- to 15-Hz

activity in the absence of both 8- to 11-Hz activity and high-voltage transients. Training consisted of three 1-hour sessions per week for 12 weeks. Three of the four animals were able to increase their SMR activity, and those same three demonstrated a significant decrease in seizure susceptibility when compared to four control animals. The results in this study paralleled those with cats (Sterman, 1973; Sterman *et al.*, 1969) and, as will be discussed later, led to the suggestion that SMR training might have caused the activation of antagonistic pathways and the inhibition of seizure activity.

In another series of experiments, a group led by Wyler at the University of Washington demonstrated that operant conditioning techniques could be applied to single neurons (Fetz & Baker, 1973; Fetz & Wyler, 1973; Wyler & Fetz, 1974). Wyler, Fetz, & Ward (1975) utilized subpial injections of aluminum hydroxide in the sensorimotor cortex of five primates in order to render them chronically epileptic. Recordings from single neurons were then characterized according to a predetermined burst index as normal, moderately epileptic, or highly epileptic. In operant sessions, monkeys were first trained to acquire bidirectional control of normal neurons. After gaining control, training was then started on the epileptic neurons. The initial indications were promising in that single-cell conditioning was well correlated with a decrease in the proportion of epileptic neurons. A reduction of seizures was also evidenced during training, but due to numerous experimental variables it could not be definitely stated that there was a dependent relation.

Studies designed to further examine the biofeedback training situation have raised some interesting questions in relation to factors of stress and attention. Lockard, Wilson & Uhlir (1972), for example, demonstrated that the seizure activity of chronically epileptic monkeys could be significantly altered by placing them in an operant avoidance training situation. During the training sessions no seizures were observed, but a significant increase was evidenced in other situations, especially on days when no training took place. This led to the suggestion that the increase in seizures might be due to stress factors common to the avoidance and biofeedback designs. Support for this conclusion was provided in a later study (Lockard, Foltz, Ehle, & Haller, 1977) in which normal monkeys developed severe gastrointestinal disorders when placed on an avoidance schedule.

Other primate studies that add to the above cited data have examined such parameters as (1) EMG suppression, (2) reinforcement for producing 18- to 23-Hz activity, (3) reinforcement for producing 9-Hz activity, (4) reinforcement for reducing 9-Hz activity, and (5) EEG spectral activity associated with task performance (Wyler, 1977; Lockard, Wyler, Finch, & Hurlburt, 1977; Wyler, Lockard, DuCharme, & Perkins, 1977). These studies produced mixed results that might be summarized as follows: (1) 18- to 23-Hz conditioning was generally found to decrease seizure intensity while increasing the frequency of seizure occurrence; (2) 9-Hz train-

ing in either direction did not produce significant results; (3) stress factors common to the biofeedback situation can enhance seizures; (4) attentional factors appear to play a significant role in the avoidance, EMG, and EEG biofeedback studies; and (5) there might be specific spectral "signatures" related to task performance or the acquisition of a required response.

History: Clinical Studies. The accidental discovery that SMR-trained cats were highly resistant to MMH-induced seizures (Sterman, LoPresti, & Fairchild, 1969) led to its clinical application by Sterman and Friar (1972). In their study, an adult female human with generalized major motor seizures (grand mal) was trained to increase rolandic 11- to 13-Hz activity. Feedback was provided in the form of a bank of lights and a chime activated by a logic circuit. One year after the start of training, seizure occurrence was reported to be just one per 3-month period, a reduction from the pretraining level of approximately two seizures per month. A significant increase in 11- to 13-Hz activity in the EEG as well as subjective changes in attitude and sleep were also noted.

Sterman, MacDonald, and Stone (1974) studied SMR feedback in four poorly controlled epileptics and reported findings comparable to their earlier study. Training occurred for 30–50 minutes, 3 days per week. An important alteration in procedure included the addition of two inhibit channels to the logic circuit. Any abnormal slow-wave activity or large-voltage transients would inhibit the delivery of reinforcement. This addition served to prevent the accidental reinforcement of abnormal epileptic activity. The researchers reported a decrease in seizure occurrence for all patients. Furthermore, when training was discontinued in three patients, an increase in seizure activity was noted. The fourth patient was given a portable unit for home training and experienced no such increase.

A number of other investigators have utilized SMR-training procedures similar to Sterman's with mixed results (Finley, 1976, 1977; Finley et al., 1975; Kaplan, 1975; Lubar & Bahler, 1976; Seifert & Lubar, 1975). Lubar and Bahler (1976) gave feedback in the form of a digital count of cumulative SMR bursts per minute, a row of lights, a tone, a slide projector, and a green light signaling the absence of slow-wave activity (4–7 Hz). Their report was an expansion of an earlier study (Seifert & Lubar, 1975). Five of the eight patients demonstrated a clear decrease in the frequency of seizure activity, and the conditions of the other three seemed to improve in relation to duration or intensity. Of major interest was the general increase in seizure activity on withdrawal from training and the decrease corresponding to the resumption of treatment.

Finley (1976, 1977) used a blue light for signaling 11- to 13-Hz activity, a red light to indicate epileptiform activity, and an automatic counter. For every 5 seconds of SMR without abnormal activity, the patient received monetary reinforcement. Sterman (1973) had previously reported that monetary reinforcement with one patient was well correlated with significant increase in the production of 11- to 13-Hz activity.

Of most importance in Finley's studies, however, was the use of noncontingent feedback and the recognition that drug dosages need to be closely monitored during training. Finley reported an increase in SMR activity and a decrease in seizure severity during contingent feedback training for the two patients being studied. During noncontingent feedback sessions, subjective increases in seizure activity and intensity were reported, as were decreases in SMR activity. Due to concern for the patients, contingent feedback training was reinstituted before enough data could be collected to demonstrate statistically significant change. Also of interest was the report by Finley that medication was gradually reduced during training without adverse results.

Not all investigators agreed, however, that SMR was the optimal treatment frequency. Kaplan first raised the issue when she was unable to duplicate Sterman's results with a digital filtering device that was admittedly stricter than an analog device. Instead, both Kaplan (1975) and Kuhlman (1978) found the 9- to 11-Hz activity, known as *mu activity*, to be a preferred alternative for treatment efficacy.

Later findings by Sterman and MacDonald (1978) and Wyler (1977) agreed with those of Kuhlman and Kaplan that 12- to 16-Hz activity was not only therapeutic frequency. Indeed, they suggested that reinforcement for activity anywhere in the 9- to 26-Hz range can be efective in treating epileptic manifestations.

To complicate matters further, a recent study by Cott, Pavloski, and Black (1979) found that epileptiform activity could be effectively reduced by utilizing a simple time-out procedure in the presence of high-amplitide slow-wave activity. It is interesting to note that a majority of the aforementioned studies utilized inhibit circuits to prevent feedback in the presence of abnormal activity.

In summary, the confusion surrounding the issue of EEG biofeedback efficacy is due to the above hardware (machine–electronics) variables and numerous other factors such as drug regimen, patient sex, filtering methods, feedback modalities (lights, chimes, trains, bells, etc.), treatment doses, task demands, and even cognitive sets.

Despite the great variability, certain common elements already mentioned but worth repeating have emerged from the literature in relation to treatment efficacy. Successful training and clinical improvement was almost always accompanied by (1) a decrease in high-amplitude slow-wave activity in the 4- to 7-Hz range and (2) a corresponding shift to low-amplitude, higher frequency activity in the 9- to 24-Hz range. The latter changes were most obvious when reinforcement or positive feedback was provided contingent on elimination of epileptiform activity. In general, behavioral conditions conducive to successful training are described as involving decreases in both tonic and phasic motor activity and an alert and attentive state.

Mechanisms. Due to the complexity of the problem and the relatively small number of clinical applications thus far, the various

mechanisms that have been postulated to account for the biofeedback process have been necessarily conservative in their descriptions. Sterman, for example, postulates that with biofeedback training the brain undergoes a long-term process of neuronal reorganization and tends to "normalize" in terms of function and EEG activity. He attributes this process to "exercise" of thalamocortical pathways related to motor control. It is further postulated that SMR might represent a "bioelectric" label for the process of motor inhibition (Sterman, 1973) and might be related to second-stage slow-wave sleep spindles (Sterman, 1978).

In a recent review, Kuhlman (1978) cites another alternative, known as the voluntary control model. He explains that this model involves the gaining of discriminative abilities or awareness of internal ictal events. The idea, of course, is that awareness allows for the development of coping skills such as relaxation or alerting that might be utilized by the individual to offset seizure activity. Studies by Stevens (1962) and Upton and Longmire (1975) are said to be representative of this approach. As Kuhlman and Kaplan (1978) noted, however, little success has been gained by this method of training.

Wyler (1977) suggests a third alternative involving factors of alerting or attending to an operant task. He suggests that alerting causes desynchronous activity within the focus, thereby blocking the formation of a "critical mass." Sterman and MacDonald (1978), however, argue that nonspecific factors such as attention or alerting (Wyler, Lockard, Ward, & Finch, 1976), relaxation (Kaplan, 1975), or placebo effects (Stroebel & Glueck, 1973) could not possibly account for the changes attributed to EEG conditioning.

> The temptation to attribute seizure reductions with EEG operant conditioning to nonspecific factors such as attention or the so-called "placebo effect" has been strong. There is no question that nonspecific influences can lead to seizure reductions in epileptics. However, such influences cannot account for the bulk of the present findings. (Sterman & MacDonald, 1978, p. 218)

They base their statement on the following three factors: (1) that no seizure reduction was evidenced during noncontingent or EMG feedback periods (Wyler *et al.*, 1976; Kuhlman & Allison, 1977); (2) that seizure reduction usually took place after 6 months of training; and (3) that the use of frequencies above 25 Hz might be contraindicated as Wyler (1977) discovered that they can serve to exacerbate seizures.

Although there is little doubt that neither relaxation nor a placebo effect can account for the observed alterations in seizure activity, the argument against attentional factors is much less convincing. If attention is viewed as a nonspecific factor with little to differentiate it from arousal or activation, then the 25 (+)-Hz. evidence would indeed be a convincing argument that attention plays little or no role in the tonic alteration of electrocortical activity. Attention is not, however, the same as activation, and it should not be viewed as a unidimensional phenomenon lying

along the relaxation–activation continuum. As noted by the Laceys (Lacey, 1955; Lacey & Lacey, 1958, 1974), attention should be viewed as a specific pattern of autonomic and electrophysiological responsiveness that can vary among individuals and situations.

Therefore, a fourth mechanism that allows for a specific attentional process gives added significance to the statement of Wyler *et al.* (1976) that "In all the above studies, including Sterman's, the fact that patients had to attend to a discriminative stimulus is obtrusively present" (p. 511).

The notion of a specific or *directed attentional complex* dates back to Leibnitz and the use of the term *apperception*. Modern theorists know this phenomenon as the "orienting reflex" (Pavlov, 1927), "alerting," or the "preparedness response" (Lacey, 1955). The behavioral and physiological response sequence first involves the turning of the head and eyes toward the significant stimulus, with a corresponding decrease in overt activity. Next, respiration is altered, psychogalvanic reflex occurs, pupils dilate, and peripheral blood vessels constrict while blood vessels in the head dilate. Finally, electrophysiological changes include desynchronization (alpha blocking) and changes in the evoked potential and may also be related the "expectancy waves" described by Grey Walter (Luria, 1973; Lacey & Lacey, 1974).

The changes in activity are most pronounced when the organism is attending to an object of much "biological significance" or of great reinforcement value. In the evoked potential, the changes have been defined by an increase in the late components—a phenomenon that has been related to an increase in "information value."

A study by Beck, Dustman, and Sakai (1969) demonstrated that when cortical activity was slowed through the use of bulbocapnine, a low-voltage fast activity coult be identified in relation to attentional tasks. Jung (1962) reported clinical observations of the inhibition of epileptic attacks by an active change in attention during the aura. Guerrero-Figueroa, Barros, and DeBalbian-Verster (1963) reported similar findings. They found that epileptic animals exhibited desynchronous activity during periods of behavioral alertness and demonstrated a similar effect using intravenously and orally administered GABA. They stated that "our results are suggestive that GABA produces inhibition of epileptiform activity, and in awake animals, the electrographic tracing is characterized by the following alterations: desynchronized, low to moderate amplitude and fast or mixed activity which can be compatible with behavioral alertness" (p. 238). It should be clear that, although the above data are far from conclusive, the language is all too familiar to be quickly dismissed.

The argument, therefore, is not for viewing attention as an alternative explanation for EEG biofeedback; rather, it is for viewing attentional processes as being intimately related to the biofeedback effect. It might be postulated that, within the context of Sterman's 1973 neural-exercise model, the attentional system is strengthened. Furthermore, Wyler's

1977 postulate of desynchronous activity blocking the formation of a critical mass can also be incorporated, the overall effect being a "normalization" of activity, or changes in behavioral functioning that approach as close to the limits of normalcy as is possible for a brain and a person who has experienced years of epileptic activity.

Taken together, the studies confirm that speicfic neuronal activity is subject to external modification. In addition, the procedures are essentially risk free and noninvasive, especially in comparison to those involving surgery, drugs, or stimulation.

Integration in Clinical Practice.   The results are unclear, difficult to interpret, and costly, but indisputably remarkable. Improvement seems to be a consistent finding. But, as Neal Miller (1969), a mentor in the abused field of biofeedback, has often reminded us, we should be "bold in what we try, but cautious in what we say." The elephant's trunk is in the tent, and it is highly likely that biofeedback treatments will be admitted to clinical practice in the not too distant future. At this time, however, it is not possible to expect that such programs can provide a waiting service for the interested consumer or that clinical epileptologists can consider such treatment as a practical routine alternative for their patients.

The clinician should be aware that family or other factors often present overwhelming adverse conditions that constrain and perhaps exclude the suitability of proper treatment protocols. If, however, psychotherapy, biofeedback, or behavior therapy is deemed appropriate, there remain many decisions to be made, many steps to be taken, and many demands to be met. The therapist must decide on the priority of behaviors to be addressed, which will often determine which of the particular techniques is to be employed. Mostofsky (1981) has discussed elsewhere the distinctions among *disease, illness,* and *predicament* as they relate to diagnosis, treatment, and patient care. These dimensions of sickness are different in important ways and provide additional clarification for appreciating the domain of behavioral medicine programs as it relates to the treatment of the epilepsies. The patient will be requested to carefully monitor, hour by hour over a 2- to 3-month period, the baseline symptoms and other behaviors prior to implementation of a course of treatment. The physician will be requested to refrain from adjusting the drug program (unless critically warranted) and perhaps to consider agreeing to reduce medications contingent on demonstrated clinical improvement (an important reinforcer meaningful to many patients). The therapist might recommend some residential or other facility where intensive monitoring and environmental control can be reliably carried out—if, indeed, such options exist in the community. Together with the social worker, human resources agency, psychiatrist, or clinical psychologist, the therapy team might wish to invite participation by family members, school personnel, or employer. Not infrequently, special education, family therapy, and the resolution of other patient complaints will comprise the final behavioral medicine plan. Often, the services of

competent therapists will have to be obtained by referral to those who maintain private practice, but such services are available.

The neurologist should be able to be critical, supportive, realistic, and optimistic as the program proceeds. The neurologist must make an effort to become familiar with resources available in the community, among local academic centers, and from the Epilepsy Foundation of America and its network of state and local chapters. If time and temperament permit, the physician can be a valuable advocate for social and medical change, for support of basic and clinical research in behavioral medicine enterprises, and for encouraging better training, better research, and better comprehensive treatment. Above all, the physician and the behavior therapist (of any persuasion) should appreciate that behavioral medicine offers a real opportunity to provide relief for the individual with epilepsy and, thereby, to contribute to better medicine.

REFERENCES

Adams, K. M., Klinge, V., & Keiser, T. W. The extinction of a self-injurious behavior in an epileptic child. *Behavior Research and Therapy,* 1973, *11,* 351–356.

Balaschak, B., & Mostofsky, D. I. Seizure disorder. In E. Mash & L. Terdal (Eds.), *Behavioral assessment of childhood disorder.* New York: Guilford Press, 1981, 601–637.

Beck, E. C., Dustman, R. E., & Sakai, M. Electrophysiological correlates of selective attention. In R. Evans & T. B. Mullholland (Eds.), *Attention in neurophysiology: Conference on the concept of attention in neurophysiology, 1967.* London: Butterworth, 1969.

Bouyer, J. J., Dedet, L., Debray, O., & Rougeul, A. Restraint in primate chair may cause unusual behaviour in baboons: Electrocorticographic correlates and corrective effects of diazepam. *Electroencephalography and Clinical Neurophysiology,* 1978, *44,* 562–567.

Bowersox, S., Siegel, M. J., & Sterman, M. B. Effect of restraint on monomethylhydrazine induced seizures in cats. *Electroencephalography and Clinical Neurophysiology,* 1977, *42,* 737.

Chase, M. H., & Harper, R. M. Somatomotor and visceromotor correlates of operantly conditioning 12–14 c/sec. sensorimotor cortical activity. *Electroencephalography and Clinical Neurophysiology,* 1971, *31,* 85–92.

Cott, A., Pavloski, R. P., & Black, A. H. Reducing epileptic seizures through operant conditioning of central nervous system activity: Procedural variables. *Science,* 1979, *203,* 73–75.

Daniels, L. K. The treatment of grand mal epilepsy by covert and operant conditioning techniques: A case study. *Psychosomatics,* 1975, *39,* 417–420.

Feldman, R. G., & Paul, M. G. Identity of emotional triggers in epilepsy. *Journal of Nervous and Mental Disorders,* 1976, *162,* 345.

Fetz, E. E. and Baker, M. A. Operantly conditioned patterns of precentral unit activity and correlated responses in adjacent cells and contralateral muscles. *Journal of Neurophysiology,* 1973, *36,* 179–294.

Fetz, E. E. and Wyler, A. R. Operantly conditioned firing patterns of epileptic neurons in the monkey motor cortex. *Experimental Neurology,* 1973, *40,* 587–607.

Finley, W. W. Effects of sham feedback following successful SMR training in an epileptic: Follow-up study. *Biofeedback and Self-Regulation,* 1976, *1,* 227–236.

Finley, W. W. Operant conditioning of the EEG in two patients with epilepsy: Methodological and clinical considerations. *Pavlovian Journal,* 1977, *1,* 93–111.

Finley, W. W., Smith, H. A., and Etherton, M. D. Reduction of seizures and normalization of

the FEG in a severe epileptic following sensorimotor biofeedback training: A preliminary study. *Biological Psychology*, 1975, *2*, 189–203.

Flannery, J. B., Jr., & Cautela, J. R. Seizures: Controlling the uncontrollable. *Journal of Rehabilitation*, 1973, *39*, 34.

Forster, F. *Reflex epilepsy.* Springfield, Ill.: Charles C. Thomas, 1978.

Guerrero-Figueroa, R., Barros, A., & DeBalbian-Verster, F. Some inhibiting effects of attentive factors on experimental epilepsy. *Epilepsia*, 1963, *4*, 222–240.

Harper, R. M., & Sterman, M. B. Subcortical unit activity during a conditioned 12–14 Hz. sensorimotor EEG rhythm in the cat. *Proceedings of the Federation of Biological Societies*, 1972, *31*, 404. (Abstract)

Holcombe, V., Sterman, M. B., Goodman, S. J. & Fairchild, M. D. The immobilization response in rhesus monkeys: A behavioral and electroencephalographic study. *Experimental Neurology*, 1979, *63*, 420–435.

Howe, R. C., & Sterman, M. B. Cortical-subcortical EEG correlates of suppressed motor behavior during sleep and waking in the cat. *Electroencephalography and Clinical Neurophysiology*, 1972, *32*, 681–695.

Howe, R. C., & Sterman, M. B. Somatosensory system evoked potentials during waking behavior and sleep in the cat. *Electroencephalography and Clinical Neurophysiology*, 1973, *34*, 605–618.

Iwata, B. A., & Lorentzson, A. M. Operant control of seizure-like behavior in an institutionalized retarded adult. *Behavior Therapy*, 1976, *7*, 247–251.

Jung, R. Blocking of petit mal attacks by sensory arousal and inhibition of attacks by an active change in attention during the epileptic aura. *Epilepsia*, 1962, *3*, 435–437.

Kaplan, B. J. Biofeedback in epileptics: Equivocal relationship of reinforced EEG frequency to seizure reduction. *Epilepsia*, 1975, *16*, 477–485.

Kuhlman, W. N. EEG feedback training of epileptic patients: Clinical and electroencephalographic analysis. *Electroencephalography and Clinical Neurophysiology*, 1978, *45*, 699–710.

Kuhlman, W. N., & Allison, T. EEG feedback training in the treatment of epilepsy: Some questions and some answers. *Pavlovian Journal of Biological Science*, 1977, *1*, 77–104.

Lacey, J. I. Individual differences in somatic response patterns. *Journal of Comparative and Physiological Psychology*, 1955, *43*, 338–350.

Lacey, J. I., & Lacey, B. C. Verification and extension of the principle of autonomic response-stereotype. *American Journal of Psychology*, 1958, *71*, 50–73.

Lacey, J. I., & Lacey, B. C. On heart rate responses and behavior; A reply to Elliot. *Journal of Personality and Social Psychology*, 1974, *30*(1), 1–18.

Lockard, J. S., Wilson, W. L. and Uhlir, V. Spontaneous seizure frequency and avoidance conditioning in monkeys. *Epilepsia*, 1972, *13*, 437–444.

Lockard, J. S., Foltz, E. L., Ehle, A. L. and Haller, R. G. Ileum motility during avoidance conditioning in monkey, pre- and post-cingulumotomy. *Physiology and Behavior*, 1977, *18*, 111–117.

Lockard, J. S., Wyler, A. R., Finch, C. A., and Hurlburt, K. E. EEG operant conditioning in a monkey model: seizure data. *Epilepsia*, 1977, *18*, 471–479.

Lubar, J. F., & Bahler, W. W. Behavioral management of epileptic seizures following EEG biofeedback training of the sensorimotor rhythm. *Biofeedback and Self-Regulation*, 1976, *1*(1), 77–104.

Lucas, E. A., & Sterman, M. B. The polycyclic sleep-wake cycle in the cat: Effects produced by sensorimotor conditioning. *Experimental Neurology*, 1974, *42*, 347–368.

Luria, A. R. *The working brain.* New York: Basic Books, 1973.

Miller, N. Learning of visceral and glandular responses. *Science*, 1969, *163*, 434–445.

Mostofsky, D. I. Epilepsy: Action for improving socialization and family support. In L. G. Perlman (Ed.), *The role of vocational rehabilitation in the 1980's: A report of the Third Mary E. Switzer Memorial Seminar, 1978.* Washington, D.C.: National Rehabilitation Association, 1978.

Mostofsky, D. I. Paroxysmal disorders of the central nervous system. In M. Turner (Ed.), *Handbook of clinical behavior therapy.* New York: Wiley, 1981, 447–474.

Mostofsky, D. I., & Balaschak, B. Psychobiological control of seizures. *Psychological Bulletin,* 1977, *84,* 723.

Muthen, J. *Psychological treatment of seizures.* Unpublished doctoral thesis. Uppsala University, Uppsala, Sweden, 1978.

Ounsted, C., Lee, D., & Hutt, S. J. Electroencephalographic and clinical changes in an epileptic child during repeated photic stimulation. *Electroencephalography and Clinical Neurophysiology,* 1966, *21,* 388–391.

Pavlov, I. P. *Conditioned reflexes: An investigation of the physiological activity of the cerebral cortex* (G. V. Anrep, trans.) London and N.Y.: Oxford University Press, 1927.

Roth, S. R., Sterman, M. B., & Clemente, C. D. Comparison of EEG correlates of reinforcement, internal inhibition and sleep. *Electroencephalography and Clinical Neurophysiology,* 1967, *23,* 509–520.

Seifert, A. R. and Lubar, J. F. Reduction of seizures through EEG biofeedback training. *Biological Psychology,* 1975, *3,* 81–109.

Shouse, M. N., & Sterman, M. B. Changes in seizure susceptibility, sleep time, and sleep spindles following thalamic and cerebellar lesions. *Electroencephalography and Clinical Neurophysiology,* 1979, *46,* 1–12.

Sterman, M. B. Neurophysiologic and clinical studies of sensorimotor EEG biofeedback training: Some effects of epilepsy. *Seminars in Psychiatry,* 1973, *5*(4), 507–525.

Sterman, M. B. Effects of sleep and EEG spectral patterns in normals, epileptics and insomniacs. Personal communication, June 1978.

Sterman, M. B., & Friar, L. Suppression of seizures in an epileptic following sensorimotor EEG feedback training. *Electroencephalography and Clinical Neurophysiology,* 1972, *33,* 89–95.

Sterman, M. B., & MacDonald, L. R. Effects of central cortical EEG feedback training on incidence of poorly controlled seizures. *Epilepsia,* 1978, *19,* 207–222.

Sterman, M. B., LoPresti, R. W., & Fairchild, M. D. Electroencephalographic and behavioral studies of monomethylhydrazine toxicity in the cat (*AMRL-TR-69-3*). Aerospace Medical Research Laboratory, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio, 1969.

Sterman, M. B., MacDonald, L. R., & Stone, R. K. Biofeedback training of the sensorimotor EEG rhythm in man: Effects on epilepsy. *Epilepsia,* 1974, *15,* 395–416.

Sterman, M. B., Goodman, S. J., & Kovalesky, R. J. *Effects of sensorimotor EEG feedback training on seizure susceptibility in the rhesus monkey.* Unpublished manuscript, 1978. (Available from M. B. Sterman, Veterans Administration Hospital, Sepulveda, California 91343).

Stevens, J. R. Endogenous conditioning to cerebral electrical transients in man. *Science,* 1962, *137,* 974–976.

Stroebel, C. R., & Glueck, B. C. Biofeedback treatment in medicine and psychiatry; An ultimate placebo. In L. Birk (Ed.), *Biofeedback: Behavioral medicine.* New York: Grune & Stratton, 1973.

Upton, A. R. M., & Longmire, D. The effects of feedback on focal epileptic discharges in man: A preliminary report. *Canadian Journal of Neurological Science,* 1975, *2,* 153–167.

Williams, D. T. *The impact of psychiatric intervention on patients with uncontrolled seizures.* Paper presented at International Symposium on Psychological Treatments of Epilepsy, Trondheim, Norway, May 1979.

Wright, L. Aversive conditioning of self-induced seizures. *Behavior Therapy,* 1973, *4,* 712–713.

Wyler, A. R. Operant conditioning of epileptic neurons in monkeys and its theoretical application to EEG operant conditioning in humans. *Pavlovian Journal,* 1977, *12,* 130–146.

Wyler, A. R. and Fetz, E. E. Behavioral control of firing patterns of normal and abnormal neurons in chronic epileptic cortex. *Experimental Neurology*, 1974, *42*, 448–464.

Wyler, A. R., Fetz, E. E., and Ward, A. A. Jr. Firing patterns of epileptic and normal neurons in the chronic alumina focus in undrugged monkeys during different behavioral states. *Brain Research*, 1975, *98*, 1–20.

Wyler, A. R., Lockard, J. S., DuCharme, L. L. and Perkins, M. G. EEG operant conditioning in a monkey model: EEG spectral analysis. *Epilepsia*, 1977, *18*, 481–488.

Wyler, A. R., Lockard, J. S., Ward, A. A., & Finch, C. A. Conditioned EEG desynchronization and seizure occurrence in patients. *Electroencephalography and Clinical Neurophysiology*, 1976, *41*, 501–512.

Wyricka, W. and Sterman, M. B. Instrumental conditioning of sensorimotor cortex EEG spindles in the waking cat. *Physiology and Behavior*, 1968, *3*, 703–707.

Chronic Pain

STEVEN ZLUTNICK AND C. BARR TAYLOR

INTRODUCTION

The management of chronic pain has become a major problem for the health care industry. Those individuals who fit the so-called chronic pain syndrome are particularly difficult to treat and consume a large portion of health care time and resources, as well as a disproportionate share of the health care dollar relative to their demonstrable pathology. For example, the treatment of low back pain alone costs the health care system billions of dollars every year (Holden, 1979). This syndrome, appropriate to a subset of pain patients, has been described by Black (1975) as one of intractable pain of at least 6 months duration, multiple pain complaints that are inappropriate or out of proportion to existing physical problems, frequent abuse of a wide variety of analgesic and hypnosedative medications, and use of the medical system characterized by polysurgery, polyaddiction, and polymedicine. In this chapter we will focus on the assessment, treatment and research on chronic-pain syndrome patients, although the procedures to be discussed are equally applicable to chronic-pain patients with demonstrable pathology.

In the recently devised *Diagnostic and Statistical Manual of the American Psychiatric Association* (DSM III, 1980), chronic pain is defined as a "clinical syndrome in which the predominant feature is the complaint of pain in the absence of adequate findings, not attributable to any other mental or physical disorder, and associated with evidence of the

STEVEN ZLUTNICK • Department of Educational Psychology/Counseling, University of San Francisco and Pacific Medical Center, San Francisco, California 94118.   C. BARR TAYLOR • Department of Psychiatry, Stanford University, Stanford, California 94305.

etiological role of psychological factors" (p. 247). It is included under somatoform disorders as psychalgia. The diagnostic criteria for psychalgia are as follows:

1. An episode of pain is the predominant disturbance.
2. Either pain as a symptom does not follow neurological distribution or no organic pathology can be found to account for the pain after extensive evaluation.
3. Psychological factors are judged to be etiologically involved in the pain because of a temporal relationship between "psychologically meaningful environmental stimuli and beginning of the pain, or the pain enables the individual to avoid some activity or to gain support from the environment that might not be forthcoming otherwise." (p. 247)

Although the definition is more flexible than the more traditional definition of chronic-pain syndrome in that it includes patients not heavily involved with analgesics or hypnosedatives, it suffers from two major problems. First, many patients with normal neurological distributions of pain complaints meet the criteria for psychalgia. Further, Corley and Zlutnick (1980) have previously noted the dangers of attempting to use evidence of known pathophysiological syndromes as criteria for determining the "reliability" of a patient's pain. Such pursuits rapidly degenerate into questions about the patient's integrity and often delay much needed treatment. Second, the DSM III diagnosis is quite imprecise because it is rarely possible and usually meaningless to attempt to demonstrate that a particular pain began coincidentally with "psychologically meaningful environmental stimuli." Far more important is knowledge pertaining to the ongoing relationship among environmental stimuli and chronic-pain complaints. However, this must be substantiated carefully with data. Furthermore, it is usually conjecture, not fact, that "the pain enables the individual to avoid some activity or to gain support from the environment that might not be forthcoming otherwise"; this as we will see, is very difficult to substantiate empirically. Because of these two major problems, we will adhere to the more traditional definition as presented by Black (1975), although we will include patients in our discussion who are not abusing drugs because, in our experience as well as that of others (Fordyce, 1977), chronic-pain syndrome can occur in the absence of medication abuse.

The chapter is divided into five sections: issues and methods for the assessment of pain; theoretical issues in a behavioral approach to the treatment of pain patients; a review of current outcome studies of chronic-pain programs; a review of current techniques employed in these programs; and a brief description of the inpatient program used by the present authors.

ASSESSMENT OF PAIN

Any discussion of the treatment of chronic pain must begin with the troublesome problem of how to measure it. Clinical pain, like any subjective experience, is impossible to validate by external measure, and any means we choose can only be assumed to reflect an internal pain process. Thus, all measures of "pain," including verbal operants, are indirect to some extent. Nevertheless, there are a number of strategies to measure either some form of pain report or variables assumed to relate to pain. Table I shows groupings of possible measures, both subjective and objective, that can be used with chronic-pain patients. Although the categories are arbitrary, and not presented as all-inclusive, they are intended to provide a framework for conceptualizing the measurement of pain.

Self-Report of Pain

Self-report pain scales are one of the most commonly used methods of measuring chronic pain. Usually these scales require a patient to rate his or her pain on a scale (e.g., from 0 to n) and to make the rating for that moment, or for the previous hour, day, or longer. For example, Sternbach (1974) obtained a once per day overall pain rating on a 0–100 scale, whereas Fordyce (1977) employed an hourly rating of 0–100. Most scales are anchored with verbal descriptions in order to provide the patient with some means of judging pain. Mersky and Spear (1967) attempted to anchor points on the scale by having subjects identify key adjectives describing a particular level of pain; for example, intolerable might be 90 on a scale of 0–100, and mild might be a 30. Figure 1 illustrates the self-report scale that the authors customarily use. The patient is asked to rate his or her pain on a 0–5 scale, with 0 representing no pain and 5 representing pain "so intense that prolonged periods at this level would force you to consider suicide." Other columns on the same line require the patient to similarly rate his or her mood, estimate time and amounts of activity, note medication utilization, and specify some of the conditions under which the report occurred.

In deciding whether to use self-report as an outcome or process measure of pain treatment, concerns about how accurately and under what conditions the self-report is obtained must be separated from the issue of whether or not the self-report reflects an internal pain process. The reliability measure of the self-report of pain is moot, since by definition a subjective experience cannot be observed. Consistency between any of the measures outlined in Table I and self-report of pain is not, of course, evidence that the self-report *per se* is valid. In fact, consistency between self-report and other pain behavior measures can vary widely between subjects.

More important than the validity of the self-report is the consistency

TABLE I. POTENTIAL MEASURES OF "PAIN"

Measure	Examples
Verbal behavior	Self-reported rating scales
Self-report of pain	(Fordyce, 1977;
	Mersky & Spear 1967; Zlutnick, 1976)
Pain complaints	Complaint slips (Wooley, 1978);
	frequency counts
Voice properties	Behavioral observations;
(e.g., increased pitch)	instrumentation
Medication usage	Prescription records;
	number of pharmacies involved;
	amount spent on medications
Utilization of health care system	Number of office visits;
	number of surgeries;
	costs;
	number of emergency room visits;
	number of physicians consulted;
	medicaid printouts
Activity	
General activity	Self-report (Fordyce, 1977;
(time in/out of bed, etc.)	Zlutnick, 1976); ambulatory monitoring
Tolerance to specific activities	Straight leg raise and position of back;
	distance walked;
	distance swam;
	distance pedaled
Motor responses	Grimaces and clutching
Physical therapy	Number and kinds of exercises
Other variables	
Employment	Days worked;
	workdays missed
Disability	Costs
Other	
Mood	Beck Depression Scale;
	MMPI Depression Scale;
	Self-report ratings (Fordyce, 1977;
	Zlutnick, 1976)

and reliability with which it is completed (e.g., whether the rating is done by the patient at the times and conditions he or she has specified). Issues of consistency and reliability (as described above) of self-reports have largely been ignored in the pain literature, although they have been extensively discussed in the behavioral literature in general. We could find only one report demonstrating that the pain rating was made by the patient at the time specified by the patient (Taylor, Zlutnick, Corley, & Flora, 1980). The extent to which patients accurately maintain pain

Figure 1. Self-report scale for use in evaluating pain intensity, activity, and mood.

diaries can be largely determined by the contingencies for self-report. For example, patients are not accepted into the authors' inpatient program unless they have completed 2 weeks of pain diaries. This does not, however, solve the problem of whether the diaries were completed on a regular hourly interval or in retrospect. Nonetheless, the self-report of pain, especially in the form of the diary presented in Figure 1 and when sampled at frequent intervals, does permit a behavioral analysis of variables that might be affecting the pain. These data can then be used to generate and evaluate treatment hypotheses, to demonstrate to a patient that a particular treatment, such as drugs, does not reduce pain (or serves to exacerbate it), and to monitor patient progress.

Verbal Behavior

Verbal behavior provides possibilities for a number of objective dependent measures that can be used in monitoring and quantifying chronic pain. Verbal complaints of pain (e.g., "I can't stand this pain," or "My head feels like it's splitting open") would seem to be an excellent choice of behavior that can be measured in the treatment setting. Although some authors (Melzack & Torgerson, 1971; Tursky, 1976) have attempted to categorize verbal complaints, studies reported in the literature have not utilized either spontaneous or prompted pain complaints as a dependent measure.

Another objective verbal measure of "pain behavior" is the absolute frequency of requests for medication. Requests for medications, however, are far more likely to be under the reinforcement control of medication than pain complaints.

Analgesics and hypnosedatives are often thought to contribute to the disability of chronic-pain patients (Black, 1975; Fordyce, 1977; Sternbach, 1974; Taylor et al., 1980). Thus, the patient's use of medication is a critical dependent measure of patient's improvement. Concomitantly, corroboration (i.e., reliability) of medication use by significant individuals in the patient's environment, as well as blood and/or urine drug screens during and after treatment, should be considered indispensable to any pain treatment program.

Utilization of the Health Care System

Use of the medical system by chronic-pain patients provides a number of objective measures of pain behavior, including the number of physicians seen in the past year, number of office and emergency room visits, number of days hopsitalized per year, number of surgeries, and number of pharmacists contacted. Thus, utilization data provide a wealth of information about pain patients and are observable, reliable, and generally easily obtained. For example, many disability programs keep precise data on all of these variables for patients involved in their programs.

Motor Behavior

A predominant characteristic of most chronic-pain patients is a marked reduction, or curtailment, of previous levels of activity. This can include reductions in work (at home or office), recreational activities such as sports, hobbies, sex, and family interactions, and more discrete measures such as amount of time spent in or out of bed. These activities are readily amenable to measurement and, with adequate reliability estimates, provide excellent indices of activity range.

Exercise tolerance provides another indicator of motor behavior. Objective measures of exercise tolerance include such variables as range of motion of affected limbs and quantifiable performance measures of various exercises—that is, number of miles on the exercycle, distance walked, number of laps in the pool, and so forth.

Grimaces, clutchings of apparently painful areas, and protection of a sore muscle are also potential motor behaviors that could be included in a measurement package of pain behavior.

Work-Related Variables

Vocational measures provide yet another class of objective indices of chronic pain. They might include such behaviors as latency between jobs or since last employment, number of days off (or on) the job, whether or not the patient is employed, number of job interviews since discharge from the program, number of jobs in the past year, and so on.

For those patients receiving some form of disability compensation, a number of additional measures might be relevant, including amount of time for which the patient has received compensation, the amount of compensation, and the number of agencies to which she or he has applied for compensation. Disability must, of course, also be considered as an independent measure, that is, reinforcement for pain behavior. This issue has been discussed at length in the literature and need not be elaborated here.

Mood

A number of other measures can prove useful in the assessment of pain programs, the most obvious of which has been the use of mood, particularly depression. This can be assessed in a number of ways, including self-report, the Beck Depression Scale, the Depression Scale of the MMPI (Minnesota Multiphasic Personality Inventory), and so forth. It is hardly surprising to find that a patient with a 10-year history of pain, psychological dependence on analgesic medications, joblessness, and conflict with family and physician is depressed. Furthermore, many pain medications are central nervous system depressants and thus serve to exacerbate depression in spite of brief postadministration periods of euphoria. Thus, the relationship between pain medications and depres-

sion is an empirical one, and the assessment of mood along with pain might be efficacious.

THEORETICAL ISSUES

Pain treatment programs have been generated, in part, from a set of assumptions that, although of interest theoretically, have seldom been validated by empirical test. In this section, we will review and discuss two of these assumptions and the related theoretical issues in chronic-pain research. The assumptions are that medications act as reinforcers and that pain behavior can be socially reinforced.

Medications as Reinforcers

A number of investigators (Fordyce, 1977; Sternbach, 1974; Zlutnick, 1976) have suggested that analgesics can serve to reinforce "pain" (self-reports, complaints, etc.). According to this theory, medications reinforce behaviors in the pain repertoire by a process other than immediate pain relief, that is, the primary analgesic properties of the medication are less important than other effects produced by their use such as elevated mood, euphoria, and attention provided by the individuals who dispense the medications.

The reinforcement hypothesis in regard to drugs in general has long intrigued psychologists, psychopharmacologists, and other health scientists, and much research has been generated in attempts to validate it experimentally (Thompson & Pickens, 1971). Surprisingly, strong confirmation in the laboratory has remained somewhat elusive. Research on alcohol as a reinforcer is a good example of the dilemma of producing convincing evidence for clinical intuition. Although some instances of demonstration of alcohol as a reinforcer have been reported (Kroly, Winger, Ikomi, & Wood, 1978; Mello & Mendelson, 1970), the phenomenon has been difficulty to demonstrate without elaborate, artificial procedures.[1]

Nevertheless, despite the lack of evidence for the above hypothesis, discussions about drug abuse, alcoholism, or chronic pain seldom occur without the implicit assumption of its validity. If pain medications are to be considered as reinforcers of pain behavior, investigators need to demonstrate the reinforcing value of these medications by one of two procedures that have been traditionally employed in basic research: (1) the drug could be used in an attempt to shape a new response or (2) the contingent removal of the drug following a response in the pain repertoire could be shown to produce a decrement of that response (i.e., extinction). In the

---

[1]For example, rats find the taste and smell of pure alcohol somewhat aversive and will not lick it as they would sucrose solution.

first instance, there would be clear ethical restraints under certain conditions, for example, the attempt to shape some new behavior in human subjects using morphine as a reinforcer. However, for patients with demonstrable dependence on analgesic medications, the reinforcing effect of these drugs might easily be demonstrated within the context of treatment by the differential reinforcement of other, more appropriate behavior. For example, Stitzer, Bigelow, Lawrence, Cohen, D'Lugoff, and Hawthorne (1977) improved appointment keeping at a treatment clinic for narcotic-addicted patients by making take-home methadone contingent on weekly clinic visits. In a similar fashion, Fordyce (1977) administered analgesics on fixed time schedules independent of pain complaints, ostensibly to disrupt the temporal relationship between medications and pain behavior.

The second procedure for determining the reinforcing properties of pain medication is to demonstrate extinction of the particular pain measure following the contingent removal of the drug. Sternbach (1974) and Zlutnick, Corley, and Owens (1980) have reported extinction curves following termination of medications; however, consistent replicable extinction data with drugs and pain report and/or medication requests have not been reported. One difficulty in demonstrating this phenomenon, particularly the increase in responding immediately following termination of reinforcement (i.e., the extinction "burst"), might be that the comparison of drug withdrawal with extinction is faulty, insofar as withdrawal is actually a graduated decrease in, or leaning of, reinforcement, whereas extinction is an abrupt termination of it.

Another difficulty in producing replicable extinction phenomena might be that the dependent measures chosen are insensitive to change rather than incapable of producing an extinction burst. A closer inspection of the clinical context in which the extinction burst would be expected to occur reveals that the pain repertoire is composed of many behaviors in addition to pain reports, for example, requests for pain medications, grimacing, or holding painful body parts, and that increases could be occurring with any one of these behaviors.[2] Indeed, little has been done to identify response classes of pain behavior in order to more accurately determine behavioral effects of withdrawal.

The manner in which medications are prescribed by the physician or used by the patient readily lends itself to an analogous comparison to schedules of reinforcement and provides a wealth of research opportunities. From this perspective, predictable relationships between medications and pain behavior might emerge that will parallel similar schedule effects in basic research (Ferster & Skinner, 1957). Thus, future research might include the investigation of the relationship between magnitude (amount) of medication per dose and pain complaints, the difference in

[2]Most investigators (Sternbach, 1974; Zlutnick et al., 1980) have described the extinction burst relative to self-reported pain.

intensity or frequency of pain reports or other pain behaviors following termination (withdrawal) of medications as a function of the initial "schedule" (e.g., fixed vs. variable time, PRN, etc.), and the effects of different schedules on emotional behavior during withdrawal.

In light of the above discussion, research practitioners need to make clear distinctions at the outset of treatment between therapeutic practice based on learning theory hypotheses, treatment techniques based on experimental research, and clinical research–treatment strategies designed to empirically test these hypotheses. For example, although the use of the fixed time schedule described by Fordyce (1977) can interrupt the temporal relationship between pain behavior and reinforcers, such schedules might also serve to obscure other schedule effects. Further, it still remains for investigators to demonstrate conclusively that fixed time schedules do, in fact, alter pain behaviors in any significant fashion.

Another issue in any discussion of medication as a reinforcer is the necessity of separating out cue effects of drug presentation from the effects of active ingredients. For example, many patients report pain reduction following the administration of analgesic medications before the known drug effect duration has elapsed. On the other hand, Zlutnick et al., (1980) have reported that self-reports of pain seldom reflect improvement within even a full hour of administration. Although this lack of temporal correspondence between ingestion and pain reduction might support a reinforcement theory of medications as opposed to one of pain relief due to active drug ingredients, it could simply be the case that for some patients medications keep the pain at tolerable levels. To date, however, these have been rather unreliable phenomena across patients. The use of the pain cocktail described by Fordyce (1977) is an ideal means for elminating discriminative effects of medications, because patients can no longer rely on shape, color, or amount of medications to provide the information necessary if improvement were a cue effect.

Social Reinforcement of Pain Behavior

Another popular notion in the behavioral literature on pain is that social reinforcement, particularly in the form of attention, maintains pain behavior (Fordyce, 1977; Fordyce, Fowler, & Delateur, 1968; Fordyce et al., 1973; Sternbach, 1974). The hypothesis that these stimulus events serve as reinforcers must be tested in a fashion similar to the previous hypothesis, that is, either by producing a decrement in pain report or collateral pain behavior by the withholding of these variables or by demonstrating an increase in pain in the presence of the same discriminative stimuli (i.e., the agents of social reinforcement such as relatives, friends, hospital personnel, etc.). If individuals in the patient's environment produce social reinforcement in the form of attention for behavior(s) in the pain repertoire, we would expect an increase in pain report (or other behaviors) in the presence of these social agents (i.e., they should also be

discriminative for pain). For example, Zlutnick, Taylor, Corley, and Flora (1977) had patients rate their pain (on a scale of 0–5) at 2-minute intervals under alternating stimulus conditions, including patient alone, patient with family member, patient alone, patient with doctor, and so forth. Although no differences were noted in either pain self-report or nonverbal pain behaviors such as grimacing, this represents the kind of research needed if statements about social reinforcement for pain behavior are to be accepted.

Thus, although a number of hypotheses concerning the role of reinforcement of the pain repertoire are intuitively sensible and find ready acceptance from behavioral clinicians, great care must be exerted in the design of treatment programs until these hypotheses have been carefully validated. It seems to us that some investigators are premature in translating their clinical observations and hunches into firm treatment recommendations.

OUTCOME RESULTS OF TREATMENT PROGRAMS

In this section we will review some of the recent outcome studies on learning theory–based treatment programs for chronic-pain patients. Although not necessarily all-inclusive, it demonstrates some of the difficulties inherent in evaluating these kinds of programs, including lack of experimental controls, lack of uniformity of dependent measures across studies, and so on.

Inpatient Programs

One of the earliest outcome studies of a behaviorally based inpatient pain program was reported by Fordyce (1977). The goals of this treatment program were to decrease medication intake, verbal pain complaints, and avoidance of activities due to pain and to increase exercise tolerance and general social and work activities. Patients in this sample had complained of pain for an average of 9.3 months (range, 4.5–39.6 months), the time since last employment was an average of 41 months (range, 1–216 months), and the average number of surgeries for pain was 2.7 (range, 0–13). Baseline medication intake in morphine dosage units[3] was 1.0 for narcotics plus 1.0 for other analgesics. Patients were also taking liberal amounts of hypnosedative medications. Reported outcome measures include hours per week spent walking, sitting, or standing and pain intensity (0 = no pain, 10 = unbearable pain).

Treatment duration ranged from 4 to 19 weeks, with an average of 7.7 weeks. At discharge, patients showed significant increases in activity

---

[3]One unit is equivalent to 10 mg of morphine. (See Halpern, 1974, for a more detailed description of morphine equivalencies.)

(from 64 hours per week during baseline to 88.9 hours per week at discharge) and exercise tolerance. Narcotic usage decreased from approximately 1.0 morphine unit equivalent during baseline to 0.1 units at discharge for 13 patients, other analgesic use from 1.0 morphine units to 0.2 for 26 patients, and hypnosedatives from 1.5 morphine units to 0.9 units for 30 patients. At a 76-week follow-up, activity had increased to 95 hours per week and pain intensity had decreased from an average of 8.5 to 6.2 No other follow-up data were reported.

These results are particularly significant in that they reflect a number of issues relevant to pain programs in general and Fordyce's approach specifically. The first is that self-report data, particularly with low back patients, seldom change significantly after treatment, despite large gains in activity, pain tolerance, and general satisfaction with the program. This is in sharp contrast to headache and abdominal-pain patients who frequently report total, or near-total, cessation of pain (Zlutnick et al., 1980). Second, although much research remains to be done, many investigators in the area of chronic pain remain convinced that withdrawal from all analgesic and hypnosedative medications is a critical variable in any successful rehabilitation program. Third, it is obvious that even the strictest behaviorally based treatment requires a multiplicity of treatment modalities, including behavior therapy, occupational and physical therapy, and so forth.

Outcome data on other programs based on Fordyce's model have also been reported. For example, Anderson, Cole, Gullickson, Hudgens and Roberts (1977) followed 37 patients with pain duration of 6 months or longer. A large percentage of these were described as normal at follow-up, although the method of follow-up and the criteria for normal were not stated.

Swanson, Floreen, and Swenson (1976) studied a group of 50 chronic-pain patients with back, neck, and extremity pain. Their program, which was 3–4 weeks in duration, consisted of physical therapy and rehabilitation, behavior modification techniques, medication withdrawal, biofeedback, and counseling for the patient and family members. The mean age of the patients was 48 years (range, 23–73), the mean duration of pain was 86 months (range, 3–480), and the mean number of surgeries was 2.2 (range, 0–10). At discharge, subjective pain had decreased from a mean score of 6.5 (on a 10-point scale) to 5.6. On admission, 21 patients had been using narcotics; none were using them at discharge. Further, 31 patients were completely ambulatory at discharge, 13 partially ambulatory, and 0 were not ambulatory at all. This compares to 15, 17, and 2 at admission, respectively.

Of 27 patients who had moderate improvement or better at the time of discharge, 21 participated in follow-up. Of these, 5 patients reported that their pain did not last as long, was less intense, or both as at the time of discharge, 10 patients reported that the pain remained unchanged, 6 patients reported that pain lasted longer, was more intense, or both as at

discharge, and 6 did not respond. Fifteen patients were using the same or reduced medication as at discharge, and six patients were using more medication. Further, 80% of the patients had not sought additional medical treatment at follow-up. Although these results are encouraging, a number of problems are apparent. First, no experimental controls were employed. Second, there is a large attrition rate over time. Third, follow-up data were obtained by questionnaire, with all the attendant reliability problems.

Cairns, Thomas, Mooney, and Pace (1976) reported follow-up data for 100 low back pain patients who had been treated in an operant conditioning program similar to those above. The program ranged from 4 to 6 weeks. Follow-up data were obtained at 10 months by questionnaire from 90 of the 100 patients sampled. Of these, 70% reported significantly less pain or increased activity, 58% said they required less analgesics, and 74% had sought no further medical advice or treatment. Of those patients selected for vocational training, 75% were either working or in a program. The difficulty with this kind of follow-up, in addition to the reliability problem, is the lack of specific data relative to activity, medication, and other measures, which makes comparisons with other programs difficult, if not impossible.

Other outcome studies have been reported for treatment programs that include behavioral procedures in eclectic treatment packages. Sternbach (1974) reported the results of a program that used operant conditioning techniques as part of the overall treatment milieu. Other procedures included treatment contracts and group therapy. Patients were divided into two different groups. The first group was studied from the first week in hospital to discharge. For these 50 patients, overall pain self-report scores decreased from a mean of 60 to 58 (on a scale of 0 to 100); average walking time increased from 3.5 to 5.1 hours per day, average number of laps in the gym increased from 16 to 49, and overall activity increased from 1 to 215 hours, although the significance of the changes is not clear.

In a second part of this study, 61 patients were sent a questionnaire 6 months after treatment. The characteristics of these patients were not given, but some had apparently had surgery and others had participated only in the "psychology aspect" of the program. Forty patients responded to the questionnaire; of these, 29 had "largely psychological treatment." These patients reported that pain scores (on the scale of 0 to 100) had decreased from a mean of 54 before admission to 50 after treatment; hours per day of work-like activity had increased from 4 to 4.8; and unit dosage of medication had decreased from 13 to .18. Only the change in unit dosage of medication was significant. Surgery patients showed significant changes in all of these categories. As with the other studies previously described, so many details are missing in these kinds of reports, that comparison is impossible.

Newman, Seres, Yospe, and Garlington (1978), in a follow-up of 36

patients from a sample previously reported by Seres and Newman (1976), found significant effects on similar parameters. In this program, patients were treated on a 25-bed multidisciplinary ward. Most of the patients were working males with low back pain, although other pain patients were treated. Patients were given a wide range of treatment modalities, including exercise, occupational therapy, progressive muscle relaxation, autogenic therapy, biofeedback, behavioral contracting, and transcutaneous nerve stimulation. Patients were also encouraged to "explore their feelings" and to practice communicating them more effectively. Spouses and other family members were included in the treatment. Patients were withdrawn from medications using a "masked capsule," and psychotropic medications were frequently used. There was significant baseline to discharge improvement in the various parameters listed in Table I, and for the most part these changes were maintained at follow-up 80 weeks later.

Gottlieb, Strite, Koller, Madorsky, Hockersmith, Kleeman, and Wagner (1977) reported on the results of a program using biofeedback training, individual, group, and family psychotherapy, medication reduction, physical reconditioning, vocational counseling, and education, all occurring in the context of a therapeutic milieu; average hospital stay was 45 days. All 75 patients had originally related back pain as the major cause of their previous and current disability. The mean age of patients was 43 years (range, 24–64); they averaged two surgical procedures (range, 1–8) and then had been disabled for an average of 3.6 years (range, 1.5–15). Of the 75 patients admitted to the program, 3 were rejected by the staff sometime after the 2-week evaluation because the patients were missing meetings or had violated other rules, 12 prematurely quit the program, and 50 (68% of those initially admitted) "graduated" from the program.

Three groups of measures were used to assess patient progress: (1) functional improvement (FI), which included six measurements related to physical functioning, that is, distance walked, sitting tolerance, and four subscales of clinical assessment (CA) representing the clinician's assessment of patients' behaviors; (2) pain behavior, assertiveness, comprehension of program, and comprehension of pain and anxiety; and (3) vocational restoration (V), which consisted of seven levels of vocational activities determined by vocational counseling. At discharge, there was significant improvement on all FI and CA scales, and these improvements were retained at 1-month follow-up (56% of patients). Of the 72 patients, 59 had wanted "vocational restoration" as part of their treatment. Of 50 patients who completed the program, 40 were evaluated at a 1-month follow-up; 38 (95%) of these had maintained successful levels of vocational restoration. When a sample of 23 of the 50 were contacted 6 months after discharge, 19 (92%) were either employed or in training. No other follow-up data were available.

In summary, it appears that comprehensive pain programs, whether strictly behavioral or merely utilizing behavioral techniques as part of the

overall treatment milieu, produce some improvement in patients who participate. However, the differences in patient populations, treatment techniques, outcome measures, and follow-up procedures among these studies makes meaningful comparisons impossible. Further, the lack of controls limits the interpretation of the specific usefulness of any of the programs, and simple outpatient procedures, for example, might achieve the same results. The specific contributions of the components included in many of these inpatient programs is also not clear. In the next section we will report the results of several outpatient studies, especially those in laboratory settings, that have been directed at analyzing the specific usefulness of components of pain programs.

Outpatient Procedures

Precise distinctions between suitable candidates for inpatient versus outpatient programs have yet to be empirically derived, although duration of complaints, medication abuse, and levels of physical and psychological dysfunction are probably among the more salient discriminators. Techniques such as relaxation often play a major role in the treatment of nonchronic patients, whereas these techniques are but a small part of comprehensive rehabilitation programs for chronic-pain patients.

In this section, we shall examine a number of the nonspecific techniques that are frequently employed as part of outpatient programs. We shall not refer to biofeedback in general, as extensive reviews of its effects have been discussed elsewhere (e.g., Blanchard & Ahles, 1979).

McAmmond, Davidson, & Kovitz (1971) compared the effects of relaxation, hypnosis, and a control in reducing reaction to pressure algometer stimulation and analgesia injection with dental patients. For subjects with increased skin conductance levels, relaxation was most effective in reducing stress reactions. At 5-month follow-up, all subjects in the hypnosis group had returned for dental treatment, as did 5 of 10 controls, but only 1 of 10 relaxation subjects.

Lehrer (1972) compared the effects of relaxation procedures and no instructions on reducing skin response and habituation to electric shock. Both the relaxation and the no-instruction groups habituated faster to the electric shock than an increasing-tension group; there were no differences between the relaxation and no-instruction groups.

These studies suggest that relaxation can increase pain tolerance to laboratory-controlled painful stimuli. For other clinical pain problems, controlled-outcome studies have shown that relaxation and related techniques produce significant reduction in migraine and tension headache frequency and intensity (Blanchard & Ahles, 1979). However, most of the patients in these studies were not using medication. Some patients may need to be withdrawn from medications before relaxation and related techniques are used, since many analgesics and hypnosedatives impair

concentration and attention and can hinder the ability of patients to receive optimal benefit from them.

Cognitive Approaches

Cognitive approaches to pain control include the use of attention–distraction, emotive imagery, and advanced preparation. Emotive imagery is an approach in which an individual imagines a particular event, perhaps pleasant but also distracting, as a way to cope with pain. Horan & Dellinger (1974) compared such a technique with distraction alone and a control for increasing tolerance to cold-pressor stimulation. The motive imagery condition produced significantly greater effects than the other two conditions, but other authors have found contradictory effects. For example, Greene & Reyher (1972) compared hypnotic analgesia plus pleasant imagery with analgesia alone. Only the analgesia alone was found to be effective in modifying tolerance.

In a study designed to determine which component of the Lamaze natural childbirth technique was most useful, Stone, Demchick-Stone, and Horan (1977) compared two levels of emotive imagery, a focal-point visualization technique (also part of Lamaze), a placebo, and no treatment. Using immersion time in cold water, threshold for pain report, and self-report of pain tolerance as outcome measures, they found that the emotive imagery procedure was more effective than the other techniques. A rather detailed data analysis did not reveal very large differences between the groups.

Advanced Preparation

Several studies have shown that subjects have higher pain thresholds and/or pain tolerance when they can exert control over the painful stimulus (Bowers, 1968; Staub, Tursky, & Schwartz, 1971). For example, Johnson and Rice (1974) demonstrated that prepared patients experience less discomfort during painful medical procedures. To prepare subjects about to undergo gastrointestinal endoscope examination, they explained typical sensations patients experience during endoscopy and suggested ways to cope with the discomfort. Given these instructions, patients experienced less discomfort and distress during the procedure.

In a similar study, Egbert, Battit, Welch, and Partlett (1964) prepared one group of preoperative patients by carefully explaining what they might expect in the postoperative recovery room. The experimenter discussed the type and extent of pain patients might anticipate and suggested that relaxation might help the pain but that they could ask for medication as they needed it. They were also told that they would be expected to move around in the recovery room. The treatment group requested significantly fewer narcotics following surgery than the control group and were sent home an average of 2.7 days earlier.

In considering the effectiveness of components of pain programs, it is important to remember that a technique must be very "powerful" to achieve any significant effect above and beyond what can be achieved through a variety of unspecified factors including suggestion, instructions, and placebos. Beecher (1959) was instrumental in calling attention to the power of placebos and demonstrated that they often exert as much control over pain report as active medications. For instance, he found in one study that 30% of patients obtained relief of pain presumably caused by pathological factors by the use of placebos (Beecher, 1972). Unspecified factors that have been demonstrated to have effects on pain relief include placebo medication (Beecher, 1959), suggestion (Pollack, 1966) expectation of relief (Gardner & Licklider, 1959), information (Blitz & Dinnerstein, 1968), attention–distraction (Blitz & Dinnerstein, 1971), and combinations of these procedures.

With this in mind, we shall present an overview of current research on some of the many nonspecific variables frequently employed in the treatment of pain patients.

Relaxation Therapy

Relaxation and related procedures such as autogenic training are the most extensively studied behavioral procedures for pain reduction. Since patients' pain reports are often postulated to vary with levels of anxiety, the use of anxiety reduction techniques should presumably reduce pain reports. Bobey and Davidson (1970) exposed subjects to one of four conditions: (a) relaxation, (b) increased anxiety produced by a tape of screams of women in labor, (c) cognitive rehearsal of an upcoming stressful situation, and (d) a control condition. While practicing one of these procedures, subjects were stimulated with radiant heat and pressure algometer. The relaxation group showed the highest tolerance scores to the stimuli, followed by the increased-anxiety and the cognitive-rehearsal conditions. Interestingly, all treatments were significantly different from controls with a female experimenter, but only relaxation was significantly different with a male experimenter.

Combinations of Techniques

Turk (1975) has developed a procedure referred to as stress inoculation that consists of a combination of techniques useful in the control of pain, including relaxation, attention to deep and slow breathing, diversion of attention, and transformation of the painful sensation through fantasy. Eight male volunteers were taught these techniques. Subjects trained with stress inoculation increased their tolerance on an ischemic arm test from 17 to 32 minutes, a highly significant increase. A control group given pseudo–stress inoculation training showed no changes from pre- to posttraining.

Perhaps the most widely applied uncontrolled clinical trial of the usefulness of combinations of such techniques has been with natural childbirth. Two general techniques, one developed by Rand in the 1930s and the other by Lamaze several years later, have been used with millions of women to reduce the discomfort of delivery. Lamaze (1970) assumed that women have been conditioned to believe that childbirth will be painful and that such conditioning makes it more difficult for patients to tolerate that pain. He developed a series of breathing exercises to help patients cope with childbirth pain. The breathing is combined with focal-point visualization in which a subject focuses on only one object while relaxing voluntary muscles. With the Rand technique, pregnant women learn to relax by listening to a teacher who speaks quietly, suggests pleasant images, and is generally encouraging (Chertock, 1967). Although no controlled trials have been conducted in this country of the effects of the Lamaze and Rand methods, the continued popularity of the techniques among expectant women suggests their potential usefulness and need for refinement.

The studies reviewed in this section suggest that placebos and other nonspecific effects, relaxation, emotive imagery, and advanced preparation can all have an impact on reducing the intensity of pain report. As with other procedures such as hypnosis, autogenic training, and meditation they seem most effective with discrete non-chronic-pain problems such as tension headaches. Their effectiveness with chronic patients, however, remains to be demonstrated.

TREATMENT OF CHRONIC PAIN

Because reviews of outcome studies seldom specify treatment procedures, a brief description of an inpatient program for chronic-pain patients used by present authors is described here. More detailed descriptions are presented elsewhere (Taylor et al., 1980; Zlutnick et al., 1980).

Treatment of chronic-pain patients has invariably been done in the hospital. Although the need for hospitalization has never been established empirically, the frustration of detoxifying patients on an outpatient basis has probably been a major factor. The process by which patients are referred and prepared for inpatient care has been extensively reviewed elsewhere (Corley & Zlutnick, 1980) and will not be discussed here. What follows is a review of our inpatient treatment protocol.

Step 1: Preadmission

Patients are accepted into the clinic only by referral from a physician. At this time, all pertinent medical records are reviewed by the clinic physician, and a preadmission packet, consisting of a 2-week supply of

pain diary forms, a pain history questionnaire, insurance forms, and a program description, is mailed to the patient. On return of the completed self-report forms, the patient is scheduled for an intake evaluation to obtain a more detailed history and interviews with significant family members or friends and to provide the patient with further explanation of the program and a tour of the facilities.

The results of the chart review, interview, and clinical impressions are then presented at a clinic staff meeting where a determination is made as to the patient's suitability for the treatment program. Criteria for acceptance include the following:

1. A minimum 6-month history of chronic pain.
2. A negative medical workup, or static pathology, or both.
3. Pain out of proportion to disease.
4. Analgesic and/or hypnosedative abuse (optional—see earlier discussion of chronic pain).
5. Out-of-state residence, making outpatient treatment impossible.
6. An unstable family or living environment, making outpatient treatment impossible.

The criteria for exclusion from the program include the following:

1. Concern that a physiological basis for pain has been overlooked or not adequately treated.
2. Presence of organic brain disease (particularly in the elderly).
3. Patients with antisocial personality disorders who have discovered "pain" as a legitimate source of drugs.
4. Current (or frequent past) involvement in litigation hearings. This does not rule out the acceptance of disability cases, but patients seeking to increase benefits while currently in treatment do not make good candidates.
5. Evidence of major psychiatric disturbance (manic-depressive psychosis, schizophrenia, etc.).

Prior to admission, the patient signs a contract specifying the general treatment goals, including a reiteration of the drug withdrawal procedure and a request for three deposits, one (refundable) for completion of the program, another as an advance against deductible portions of insurance, and a third (also refundable) to insure follow-up visits after discharge. The completion deposit is variable in amount and has almost eliminated departures against medical advice. If a patient cannot afford a cash completion deposit (which has ranged from $100 to $450, depending on the patient's compliance history), we have accepted valuables such as cameras, jewelry, rare books, stereo equipment, and so forth.

Patients are refused admission if they do not present themselves for admission with a minimum of 2 weeks of completed pain diary forms and all deposits.

Step 2: Baseline

The first 3–6 days are spent collecting baseline data as follows:

1. Pain, mood, and activity (pain diaries). Patients continue to record pain, mood, and activities throughout treatment.

2. Medication use. Urine drug screens are obtained on all patients. Patients are put on a PRN baseline medication regime at about 10–25% above outpatient self-report of medication use. This minimizes confrontation over requests for more medication.

3. Medical baseline. A routine history and physical examination are done. Additional medical consultations may be needed, including neurology, psychiatry, and so forth. About 20% of the patients in our program are found to have previously undisclosed pathology that could be contributing to their pain.

4. Activity. Subjects self-report activity via the pain diaries. Other activity measures are developed on a patient-by-patient basis and can include such measures as distance walked, range of motion, distance recorded on a stationary bicycle or treadmill, amount of time sitting without pain, and others.

5. Physical and occupational therapy evaluation. Patients are evaluated by the physical therapist and by an occupational therapist.

Step 3: Detoxification (Drug Withdrawal)

Detoxification is accomplished at the rate of 20–25% per day of the maximum medication use at the end of baseline, unless the pharmacological properties of the addicting drug require more prolonged periods of withdrawal. All analgesic and hypnosedative medications are then put in a pain cocktail (Fordyce, 1977). Patient management problems frequently peak on the first day the patient receives no medication. At this time, patients become more anxious, depressed, and irritable; they complain of increased pain and often threaten to leave against medical advice. At this point, reassurance, support, and understanding (i.e., "clinical skills") are most needed, and the staff must be alerted prior to the fairly predictable crisis. The primary therapist for the patient should also be available at this time.

Step 4: Postdetoxification

We have arbitrarily defined postdetoxification as beginning 24 hours after the last administration of pain-relieving and/or hypnosedative medication. Following detoxification, a number of procedures are instituted:

1. Patients are taught deep muscle relaxation, hypnosis, and other anxiety reduction procedures as an alternate coping strategy for the onset of pain.

2. Treatment goals and objectives are reevaluated. Once patients have the opportunity to realize not only that they can survive without drugs but, in fact, that they can improve (Taylor *et al.*, 1980), their motivation to comply with other therapeutic procedures increases. More traditional therapeutic interventions, primarily behavioral in nature, are also introduced at this time, including a reevaluation of the relationship between pain and stress, social skills training (e.g., assertion), job placement, physical therapy, and so forth.

3. Family therapy and follow-up. Prior to discharge, the family is convened to discuss unanticipated changes in the patient as well as new ways for the family to deal with him or her. Roles and strategies of individual family members will frequently need to change and must be addressed thoroughly before the patient is discharged.

4. The referring physician is contacted and reappraised of the patient's condition and status. Frequently, his or her role will also need to change, since the doctor–patient relationship will need to be redefined. A follow-up letter summarizing the hospital stay and future goals is also sent to the referring physician(s).

Each patient is discharged with an informal contract specifying behavioral goals (with or without contingencies), 2 weeks of pain diary sheets, and a 2- to 4-week follow-up appointment.

Step 5: Follow-Up

Follow-up visits are formally scheduled at 2–4 weeks after discharge and at 6-month intervals thereafter, with 2 weeks of diary data collected prior to each. Drug urine screens are obtained at all visits, since along with pain report and activity drug withdrawal is considered a major outcome measure (Taylor *et al.*, 1980). We have found additional visits to be useful depending primarily on the amount of psychological dysfunction and discomfort of the patient. Additional follow-up has ranged from a 5-minute phone call every 2–3 weeks to a 50-minute visit on a weekly basis.

The pain clinic described above operates on a basic commitment to data acquisition and hypothesis testing. We collect data for all patients on pain, mood, and activity. Such a system allows for accountability of patient care, as well as for the testing of most hypotheses relative to treatment, including behavioral, chemical, or surgical interventions.

CONCLUSION

In this chapter we have highlighted a number of issues and concerns in the management and treatment of the chronic-pain syndrome, defined as pain of more than 6 months duration accompanied by multiple pain complaints that are out of proportion to existing somatic problems and by

polysurgery, polysystems, and sometimes polyaddiction. Although this definition has some utility, the specific characteristics of this population remain elusive, since these patients differ widely in regard to site of pain, etiology, and psychiatric diagnosis. For example, a sample of 10 chronic-pain patients with abdominal complaints would differ dramatically in education, work history, medication use, family dynamics, psychological dysfunction, and so on. Great care must be exercised in attempts to define this population, or a few common symptoms such as pain complaints mislead us into treating chronic pain as a well-defined entity.

Further, the redefinition of chronic pain as psychalgia in the new DSM III appears unsatisfactory, since the diagnostic criteria are imprecise. Although the use of such phrases as "a temporal relationship between psychologically meaningful environmental stimuli and beginning of the pain" sound compatible with a learning-based view of pain as behavior, such a relationship remains to be experimentally validated.

Because a careful behavioral assessment of target behaviors is critical to any behaviorally based treatment regimen, the measurement of pain and collateral behaviors remains central to the treatment of chronic-pain problems. Although self-report rating scales for the measurement of pain, as well as other observable measures such as activity, have been reported and discussed, comprehensive systematic assessment protocols for pain have not been used and dependent measures vary widely across treatment programs. Additional measures other than pain intensity and activity are needed to comprehensively evaluate the effectiveness of treatment programs. These might include drug use, utilization of the health care system, vocational measures, and so forth. Without some standardization of dependent measures across programs, evaluation and comparison of techniques for the treatment of chronic pain will continue to be difficult. Finally, a cost–benefit analysis must be applied to pain treatment programs, not only to maintain accountability and credibility to peers but also to provide more effective arguments to third party payers that treatment benefits can be achieved in both personal and financial domains.

The majority of the treatment programs for chronic-pain patients are maintained as inpatient facilities and share most of the following characteristics: (1) they utilize some ongoing measurement system of pain and activity; (2) they attempt to withdraw patients from their medications; (3) they teach some form of self-control as a drug substitute; and (4) they systematically reinforce increases in activity, pain tolerance, and problem-solving abilities. Uncontrolled group outcome studies suggest that such programs result in reduction of pain and collateral behaviors. However, rigorous experimental studies, both within and between programs, are urgently needed if pain treatment programs and subsequent technologies are to evolve and maintain their credibility.

Two additional and seldom mentioned treatment variables should be mentioned here because their impact could be significant but has not been carefully investigated. The first is the adjunct clinical services em-

ployed in most comprehensive pain clinics, most notably physical and occupational therapy. These services play an integral role in the rehabilitation of the chronic-pain patient, and their contribution to increases in pain tolerance, activity, and mood have seldom been evaluated. The second unspecified treatment variable is the frequent contact between patient and treatment staff, particularly those individuals in primary therapeutic positions. Although Taylor *et al.* (1980) have demonstrated improvement with a minimum of contact, a great amount of unspecified contact occurs in most programs and its effect has not been carefully evaluated. Whether this contact occurs in the form of reassurance that the patient will survive an uncomfortable drug withdrawal or family therapy around the patient's reintegration into the home environment, these procedures need to be investigated with the same rigor that any dependent variable requires.

Although a variety of specific treatment techniques for pain control have been described, including relaxation, cognitive rehearsal, and hypnosis, their effectiveness in the context of the chronic-pain syndrome has not been systematically evaluated. Much of the research on these treatment modalities has been evaluated with outpatient populations who frequently do not fit the criteria for chronic pain as defined by either Black (1975) or DSM-III (1980). Generalization of the effectiveness of these techniques from populations with acute-pain complaints, such as headache, to the chronic low back patient, with multiple surgeries, psychological dependence on medications, and multiple systems contacts, is somewhat premature at this time and might even prove to be unwarranted in the future.

Finally, many comprehensive pain programs have based much of their work on learning theory, with particular attention to the hypotheses that medications serve to reinforce pain and that social variables, such as attention from relatives, are also significant in the maintenance of the chronic-pain repertoire. Nonetheless, controlled experimental studies of these very basic notions are lacking, and it is imperative that these assumptions be experimentally validated. Too often treatment recommendations seem to be based on logical conclusions deduced from learning theory rather than data collected from the test of valid hypotheses.

In conclusion, the problem of chronic pain presents as an area well suited to research clinicians in behavioral medicine. Advances in measurement, as well as carefully designed and controlled studies on both outcome and process, should lead to better understanding and control of this most difficult clinical population.

Horan, J. J., & Dellinger, J. K. "In vivo" emotive imagery: A preliminary test. *Perceptual and Motor Skills*, 1974, *39*, 359–362.

Johnson, J. E., & Rice, V. H. Sensory and distress components of pain: Implications for the study of clinical pain. *Nursing Research*, 1974, *23*, 203–209.

Karoly, A. J., Winger, G., Ikomi, F., & Wood, J. H. Reinforcing properties of ethanol in the rhesus monkey. *Psychopharmacology*, 1978, *58*, 19–25.

Lamaze, F. *Painless childbirth*. Chicago: Henry Regery, 1970.

Lehrer, P. M. Physiological effects of relaxation in a double-blind analog of desensitization. *Behavior Therapy*, 1972, *3*, 193–208.

McAmmond, D. M., Davidson, P. O., & Kovitz, D. M. A comparison of the effects of hypnosis and relaxation training on stress reactions in a dental situation. *American Journal of Clinical Hypnosis*, 1971, *13*, 233–242.

Mello, N. K., & Mendelson, J. H. Drinking patterns during work contingent and noncontingent alcohol acquisition. In N. K. Mello & J. H. Meldelson (Eds.), *Recent advances and studies in alcoholism: An inter-disciplinary symposium*. Washington, D.C.: National Institute of Mental Health, 1970.

Melzack, R., & Torgerson, W. S. On the language of pain. *Anesthesiology*, 1971, *34*, 50–59.

Mersky, H., & Spear, F. G. *Pain: Psychological and psychiatric aspects*. Baltimore: Williams & Wilkins, 1967.

Newman, R. I., Seres, J. L., Yospe, L. P., & Garlington, B. Multidisciplinary treatment of chronic pain: Long-term follow-up of low back pain patients. *Pain*, 1978, *4*, 283–292.

Pollack, S. Pain control by suggestion. *Journal of Oral Medicine*, 1966, *21*, 89–95.

Seres, J. L., & Newman, R. L. Results of treatment for chronic low back pain at the Portland Pain Center. *Journal of Neurosurgery*, 1976, *45*, 32–36.

Staub, E., Tursky, B., & Schwartz, G. E. Self-control and predictability: Their effects on reactions to aversive stimulation. *Journal of Personality and Social Psychology*, 1971, *18*, 157–162.

Sternbach, R. A. *Pain patients: Traits and treatment*. New York: Academic Press, 1974.

Stitzer, M., Bigelow, G., Lawrence, C., Cohen, J., D'Lugoff, B., & Hawthorne, J. Medication take-home as a reinforcer in a methadone program. *Addictive Behaviors*, 1977, *2*, 9–14.

Stone, C. I., Demchick-Stone, S. A., & Horan, J. J. Coping with pain: A comparative analysis of Lamaze and cognitive-behavioral procedures. *Journal of Psychosomatic Research*, 1977, *21*, 451–456.

Swanson, D. W., Floreen, A. C., & Swenson, W. M. Program for managing chronic pain. II. Short-term results. *Mayo Clinic Procedings*, 1976, *51*, 409–411.

Taylor, C. B., Zlutnick, S., Corley, M. J., & Flora, J. The effects of detoxification, relaxation and brief supportice therapy on chronic pain. *Pain*, 1980, *8*, 319–329.

Thompson, T. & Pickens, R. (Eds.), *Stimulus properties of drugs*. New York: Appleton-Century-Crofts, 1971.

Turk, D. *Cognitive control of pain: A skill training approach*. Unpublished manuscript, University of Waterloo, 1975.

Tursky, B. The pain perception profile: A psychophysical approach. In M. Weisenberg & B. Tursky (Eds.), *Pain: New perspectives in therapy and research*. New York: Plenum Press, 1976.

Wooley, S. C., Blackwell, B., & Wingate, C. Alerting theory model of chronic illness behavior: Theory, treatment and research. *Psychosomatic Medicine*, 1978, *40*, 379–401.

Zlutnick, S. *Recent advances in behavioral medicine*. Paper presented at the Nevada National Conference on Humanistic Behavior Modification, Las Vegas, Nevada, March 1976.

Zlutnick, S., Taylor, C. B., Corley, M. J., & Flora, J. *Stimulus control of pain behavior*. Unpublished report, 1977.

Zlutnick, S., Corley, M. J., & Owens, M. *The assessment and management of chronic pain*. Workshop presented at the annual meeting of the Association for the Advancement of Behavior Therapy, San Francisco, December 1980.

Obesity and Anorexia Nervosa

ALAN S. BELLACK AND DONALD A. WILLIAMSON

INTRODUCTION

Obesity and anorexia nervosa are two clinical disorders that result from a disturbance of normal energy regulation mechanisms. The regulation of energy is accomplished via a complex set of neurological and hormonal mechanisms (Ganong, 1975; Rodin, 1977). Technically, energy regulation can be affected by a large number of behavioral, biological, and environmental factors including energy intake and expenditure, body temperature, and climate. For humans, however, energy regulation is influenced primarily by the relative intake and expenditure of calories via eating and exercising (Ganong, 1975). Eating and exercising (or general activity level) are behaviors that to a great extent, are controlled by environmental and social factors. Clinical research studies of obesity and anorexia nervosa indicate that both of these disorders are directly caused by either excessive or inadequate eating and activity. In both cases the research suggests that these behaviors are strongly influenced by social situations and reinforcement contingencies. This chapter will discuss the nature of these two disorders and the types of interventions that have been used to modify them.

OBESITY

Obesity is a condition characterized by an excessive proportion of body fat or adipose tissue in the body mass. Precise estimation of the

ALAN S. BELLACK • Department of Psychology, University of Pittsburgh, Pittsburgh, Pennsylvania 15260. DONALD A. WILLIAMSON • Department of Psychology, Louisiana State University, Baton Rouge, Louisiana 70803.

relative amount of adipose tissue is very complex and beyond the capacity of most clinicians. Therefore, obesity has often been defined as any weight that is greater than 20% of an individual's ideal weight, as determined by tables of normative weights for an individual's height, sex, and age (e.g., Stuart & Davis, 1972). Recently, measures of skin fold thickness have also been used to estimate excess adipose tissue (Seltzer & Mayer, 1965). When evaluating the results of weight reduction efforts, it is important to keep in mind that weight loss can be caused by loss of water, adipose tissue, or muscle tissue. The goal of all treatment procedures for obesity is to decrease the amount of adipose tissue.

Depending on the criteria that are used to define obesity, estimates of the incidence of adult obesity in America range from 40 to 80 million. When excessive weight has been used as the sole criterion, it has been estimated that 25–45% of all American adults weigh at least 20% above their ideal weight (Rodin, 1977). Furthermore, other studies have found that approximately 2–15% of American children are overweight (G. V. Mann, 1974; Rodin, 1977). Considering that 80–90% of obese adolescents grow to become obese adults (Carrera, 1967), there is no question that obesity is a national health problem affecting all age groups.

The health risks of long-term, untreated obesity are quite serious. It has been estimated that the mortality rate for obese individuals is approximately 50% higher than for those of normal weight (Walen, Hauserman, & Lavin, 1977). Obesity has been found to be associated with cardiovascular, kidney, pulmonary, and gallbladder diseases. For cardiovascular diseases, in particular, there is evidence that obesity can lead to permanent damage (e.g., atherosclerosis). Extremely obese individuals are poor surgical risks, which further complicates medical care. Thus, obesity that goes untreated has very serious consequences for an individual's health and longevity.

Nonbehavioral Treatment Methods

Medical Interventions

Most medical interventions for obesity have operated from within the conceptual model that obesity is the result of improper energy regulation, that is, that more calories are consumed than expended. From this perspective, traditional medical treatment has usually been to instruct the patient to eat less and exercise more or to prescribe medications for appetite suppression. Reviews of the results of these interventions uniformly indicate that only a small proportion (about 25%) of obese patients lose as much as 20 pounds, and most of these patients regain their lost weight shortly after the termination of treatment (Chlouverakis, 1975; Feinstein, 1960; Leon, 1976; Stunkard & McLaren-Hume, 1959). Furthermore, it has been found that approximately 80% of the patients

receiving traditional medical interventions drop out of treatment. Also, it is now generally recognized that some anorexiants (e.g., amphetamines) can lead to drug dependency and behavioral changes such as insomnia and depression when used for extended (8 weeks or more) periods of time (Edison, 1971; Walen *et al.*, 1977).

Recently, intestinal bypass surgery has been used in the treatment of extreme obesity. In this operation, a major portion of the small intestine is surgically bypassed with a jejunocolic shunt. The absorptive capacity of the small intestine is thereby substantially reduced and the patient rapidly loses weight. A number of clinical reports have indicated that patients usually lose substantial weight (about 35% average weight loss) over a 12- to 18-month period but eventually stabilize at weights that are still above their ideal weights. The procedure also has serious health risks. Mortality rates have ranged from 1 to 6% (Leon, 1976) and negative side effects include chronic diarrhea, electrolyte imbalance, and liver damage. Furthermore, Neill, Marshall, and Yale (1978) have reported marital difficulties following surgery in 9 of 14 cases. Currently, there appears to be serious reconsideration of the utility of this procedure within the medical community.

Thus, to summarize, treating obesity with drugs and/or traditional medical counseling has not been effective. Though intestinal bypass surgery has been effective, its dangerous health consequences make it a treatment of last resort for cases of massive obesity.

Dieting Approaches

Practically every week the newsstands around grocery store checkout lines carry headlines claiming a new miracle diet that is guaranteed to produce weight loss without hunger or exercise. Most of these programs prescribe the consumption of nutritionally unbalanced diets that seldom produce sustained weight loss.

In contrast to these commercial diets, professional nutritionists have recommended nutritionally sound low-calorie diets combined with educational programs regarding nutrition and food selection (Mahoney & Caggiula, 1978). When dieting plans are implemented for hospitalized patients, significant weight losses are often reported. However, continued weight loss or maintenance seldom occurs after discharge from the hospital (Leon, 1976). Results with dieting plans for outpatients have generally not been very effective for significant weight loss or maintenance. Currently, professional nutritionists are investigating methods that combine programs for enhancing motivation with nutritional counseling (Barlow & Tillotson, 1978; Mahoney & Caggiula, 1978).

A more extreme dieting program is called prolonged fasting. Therapeutic fasting usually involves placing hospitalized patients on a starvation regimen for periods lasting from 14 to more than 100 days. Starvation diets require close medical supervision because several deaths

have been reported and adverse medical and psychological reactions (e.g., "near psychotic episodes," depression, and anxiety) sometimes occur during the fast (Stunkard & Rush, 1974). Most studies of prolonged fasting have reported significant weight loss during hospitalization. However, only one (Fischer, 1967) has reported substantial weight maintenance following hospitalization. Furthermore, starvation diets usually result in a relatively greater loss of muscle mass than is found on low-calorie, nutritionally balanced diets (Ganong, 1975). Prolonged fasting, like intestinal bypass surgery, is now usually recommended only as a last resort.

Traditional Psychological Approaches

Traditional psychotherapists have usually recommended individual or group therapy for the development of insight into the psychodynamic causes of obesity (e.g., Bruch, 1964; Slawson, 1965). These approaches have typically focused on the resolution of intrapsychic conflicts rather than the environmental, behavioral, or biological determinants of obesity. As a result, only a few of the psychodynamic case reports include weight loss and maintenance data (Leon, 1976). From the available data, it appears that only a small minority of the treated cases lose significant amounts of weight and that even fewer maintain their weight losses (Kornhaber, 1968; Wick, Sigman, & Kline, 1971).

Hypnosis has often been used as an adjunct to other psychological treatment programs. Usually, hypnotic suggestions have been used to modify eating habits or to produce feelings of satiation or aversion to particular foods. Most reports on hypnotherapy for obesity have not included specific weight loss or maintenance data. Also, in most reports hypnosis was combined with other procedures so that the individual effects of hypnotherapy could not be ascertained. Therefore, the efficacy of hypnosis for the treatment of obesity is presently unknown (Leon, 1976).

Supportive Group Approaches

One of the most popular treatment approaches for obesity has been attendance at nonprofit and commercial weight reduction groups such as TOPS (Take Off Pounds Sensibly). Programs such as TOPS and Weight Watchers provide group pressure and support for dieting and weight loss. An evaluation of the TOPS program reported by Stunkard, Levine, and Fox (1970) found that approximately 28% of the group members lost 20 pounds or more and that mean weight loss over a 16-month period was 15 pounds. Later studies (Jordan & Levitz, 1973; Levitz & Stunkard, 1974) showed that combining the TOPS program with a behavior modification program was superior to the TOPS program alone for weight loss and maintenance.

Summary

Of the treatment approaches discussed, only two—intestinal bypass surgery and prolonged fasting—were found to consistently produce significant weight losses and only intestinal bypass surgery was found to produce weight maintenance. However, considering the health risks involved in these two procedures, they can hardly be regarded as the treatment of choice for obesity. The other traditional treatment approaches were found to be effective only for a small minority of cases. Thus, the outcome for traditional treatment methods has not changed since Stunkard (1958) drew the conclusion that most obese persons will not stay in treatment, that most will not lose weight, and that, of those who do lose weight, most will regain it.

Recently, tremendous interest has developed regarding the use of behavior modification for the treatment of obesity. The following section will discuss the theoretical rationale for this approach, describe typical treatment and assessment procedures, and discuss pertinent outcome data.

Behavioral Treatment Methods

Theoretical Rationale

Behavioral treatment programs have been based on a blend of principles derived from operant conditioning and the social psychology of eating (Coates, 1977). This theoretical conception can best be regarded as an extension of the positive-energy imbalance model that has long been favored by physicians and nutritionists. The basic assumptions underlying behavioral treatment programs are the following:

1. Most cases of obesity are the result of a chronic positive-energy imbalance; that is, more calories are consumed than expended (Bellack, 1975).
2. This positive-energy imbalance is maintained by excessive eating, restricted exercise, or both.
3. Both eating and exercise are behaviors that are controlled by the same environmental and social factors as other behaviors.

Most behavioral treatment programs are derived from the third assumption. The natural consequences of overeating are (a) the immediate consequences of any eating such as the pleasurable taste of food and the reduction of hunger, which can be regarded as positively reinforcing, and (b) the long-term consequences such as social ridicule, poor health, early death, which are often aversive. Studies of operant reinforcement have consistently demonstrated that immediate consequences have a stronger influence on behavior than long-term consequences. Therefore, many

behavioral treatment programs have attempted to make the immediate consequences of eating more aversive or to establish contingencies between controlled eating and positive reinforcers (Bellack, 1975, 1977). Interestingly, the natural consequences of exercise are (a) the immediate consequences such as fatigue, sore muscles, which are often aversive, and (b) the long-term consequences such as improved cardiovascular health, more stamina, which are usually desirable. Until recently, very little has been done to systematically modify the consequences of exercising (Kau & Fischer, 1974; Stalonas, Johnson, & Christ, 1978). Based on this analysis of the consequent control of eating and exercising, it is easy to understand why so many individuals eat too much and exercise too little.

Behavioral treatment programs have also emphasized the control of antecedent variables. Research concerning the antecedents of eating have usually shown that the eating of obese persons is influenced primarily by external food-related cues (e.g., sight and smell of food or time of day) rather than by internal hunger cues (e.g., gastric motility) (Schachter, 1971; Schachter & Rodin, 1974; Stunkard, 1959). Based on these findings, treatment programs have often provided suggestions for regulating eating via external cues (e.g., time of day and setting) and reducing the salience of food-related cues that lead to excessive eating. Another component of many behavioral treatment programs has been to modify the "eating style of obesity" which is supposedly characterized by eating large bites, eating at rapid pace, and finishing meals before others.

Recent research has challenged the notions that obese persons have a distinctive eating style and that they are unusually responsive to external cues (Mahoney, 1975). Based on the available evidence (Rodin, 1977), it seems likely that these portions of the theoretical rationale for behavioral weight control programs might require revision. However, the three basic assumptions of the behavioral approach still appear to be on sound empirical ground. Thus, the behavioral approach to treating obesity is likely to survive current theoretical controversies.

Assessment Procedures

Initial assessment for any patient must first address whether a problem of obesity exists. If a diagnosis of obesity is established, the next step is a thorough behavioral analysis to determine the environmental and behavioral factors that maintain the obesity. A diagnosis of obesity must at least include measurement of the patient's weight and height. Based on the person's height, build, sex, and age (e.g., Stuart & Davis, 1972), one can determine the person's ideal weight and, thus, the percentage overweight. As noted earlier, obesity is usually defined as 20% overweight. Often, skin fold measurement is also included in the diagnostic workup. Standardized tables for estimating excess adipose tissue (e.g., Seltzer & Mayer, 1965) can be used to determine whether skin fold thickness is indicative of a diagnosis of obesity. Recently, clinical researchers have

also included assessment for cardiovascular health risks (e.g., blood pressure, serum lipids) and endurance measures (e.g., the step test) (Wilson, 1978). Of course, all of these measures can also be used as baseline data for treatment outcome evaluation.

During baseline and treatment phases, behavioral treatment programs have relied heavily on self-monitoring procedures for acquiring information about caloric intake and expenditure and compliance with the program procedures. Assessment of food intake usually involves keeping a diary of the types and amounts of food eaten, the number of calories consumed, the circumstances surrounding food intake, and the time and place at which the food was eaten (see Foreyt, 1977, and Stuart & Davis, 1972, for specific examples of food intake diaries). Caloric-expenditure data can also be obtained via self-monitoring using either estimates of calories expended (e.g., Stuart & Davis, 1972) or points based on Cooper's (1977) *New Aerobics* system (Wysocki, Hall, Iwata, & Riordan, 1979). Data concerning modification of eating habits usually involve self-monitoring using a checklist for each behavioral assignment.

Treatment Methods

Based on the behavioral model of obesity, interventions have usually focused on the modification of food intake, exercise, or the antecedents and consequences of these behaviors. We will briefly describe the first three types of programs in this section (consequence control will be discussed in a subsequent section).

Modification of the Stimulus Control of Eating. Stimulus control refers to the antecedent events that consistently set the occasion for the occurrence of a particular behavior. Common antecedents for excessive eating include food that is readily accessible, "family style" table setting, and particular times of the day (e.g., snacks at night). The stimulus control package (Bellack, 1975, 1977) of most behavioral programs is designed to restructure the patient's environment so that eating occurs only in the presence of a limited set of cues. It is assumed that over time these cues will gain stimulus control over eating and other cues will no longer set the occasion for eating. A typical stimulus control package might include instructions (a) to eat only at specific times and places, (b) to use small plates and cups to make smaller portions of food appear larger, (c) to eat only with a full table setting to eliminate cues for snacking, (d) to remove all leftovers if conversation is planned after a meal, and (e) to eat no more or less than three meals per day. It is wise to provide patients with a checklist to remind them of these assignments and to assess compliance with the program.

Modification of Eating Behavior. As noted earlier, it has been assumed that obese persons eat more rapidly and take larger bites than nonobese persons. Though some recent research (e.g., Mahoney, 1975) has not supported this assumption, it seems likely that a slower eating

pace should promote less eating for all persons. The rationale for this proposition is that slow eating should lengthen mealtime, make the perception of satiation cues likely before overeating occurs, and discourage unnecessary second helpings. Techniques that have been used to slow eating pace include instructions (a) to put utensils down between bites, (b) to count bites and sips, and (c) to take a 2-minute break after finishing most of the meal. This final instruction is designed to slow down eating and to break the habit of always cleaning one's plate.

Modification of Shopping Behavior. It is important to recognize that certain very salient food cues (e.g., presence of a favorite snack) can be too irresistible to an obese patient, especially at the beginning of treatment. Thus, food-shopping behavior can be modified in order to eliminate or control the availability of these foods. Common instructions for food shopping include (a) shopping only when the patient is not hungry, (b) shopping from a list and never buying spontaneously, (c) not buying problem foods, and (d) buying an assortment of foods that are low to moderate in caloric value. Many patients argue that this type of shopping is unfair to their family members. However, it should be stressed that it is important that family members support the patient in a weight reduction program and that it is good for other family members' health also to eat well-balanced diets of low-calorie foods.

Modification of Nutrition. Until recently, behavior therapists have not included systematic nutrition management as a part of their weight reduction programs (Barlow & Tillotson, 1978; Mahoney & Caggiula, 1978). Perhaps the most notable exception to this statement is the exchange diet plan of Stuart and Davis (1972). Nutrition management can be accomplished by self-monitoring of carbohydrate, lipid, and protein intake and establishing goals for each of these basic nutritional elements to insure a well-balanced low-calorie diet. The authors have found this approach to be especially helpful for the treatment of the massively obese, who must stay on low-calorie diets for very long periods of time and thus risk malnutrition if their diets are consistently unbalanced.

Modification of Exercise. Increasing exercise has, until recently, been a neglected component of most behavioral treatment programs (Stalonas et al., 1978). Considering the extensive evidence that obese persons are much more sedentary than nonobese persons (Bloom & Eidex, 1967; Chirico & Stunkard, 1966; Mayer, 1965), it seems imperative that increased caloric expenditure be included in a comprehensive weight regulation program. Of the programs that have attempted to increase activity level, the most common procedures have been either to instruct patients to integrate increased activity into their lifestyle, (e.g., use stairs instead of elevators) (Foreyt, 1977) or to self-monitor caloric expenditure and gradually increase weekly goals so that exercise is increased in a safe, but systematic, manner (Stalonas et al., 1978; Wysocki et al., 1979).

Before reviewing the treatment outcome data for these methods, it is important to recognize that few, if any, behavioral treatment programs

have included all of these procedures. Instead, clinical practitioners and researchers have usually selected a few of these methods as the basis of their treatment or research.

Evaluation of Behavioral Treatments

The treatment of obesity has been one of the major areas of study for behavioral researchers. Brightwell and Sloan (1977) reported that no fewer than 100 studies on this topic had appeared in the literature by mid-1976. Although the pace of productivity has slowed somewhat, new reports regularly appear in the leading journals. In this section of the chapter, we will attempt to provide an overview of this extensive body of literature and to present a general evaluation of behavioral treatments. Several comprehensive reviews have appeared in the last few years (see Abramson, 1973, 1977; Bellack, 1975, 1977; Hall & Hall, 1974). The reader is referred to these papers for a more detailed analysis.

Modification of the Consequences of Eating. One of the first behavioral hypotheses about the cause of overeating (and, thus, obesity) involved a simple operant analysis: Overeating persists because it has short-term positive consequences, whereas the negative consequences are quite delayed (see Ferster, Nurnberger, & Levitt, 1962). Based on this analysis, the logical treatment strategy is to attempt to alter the reinforcement balance by punishing eating or applying aversive conditioning to favored high-calorie food items. Numerous studies were conducted in the late 1960s and early 1970s to test this basic premise and/or identify suitable conditioning strategies.

A wide variety of aversive stimuli has been examined in both operant and classical conditioning paradigms. For example, Stollak (1967) administered electric shock contingent on client reports of consumption of high-calorie foods. Foreyt and Kennedy (1971) paired favored caloric food items with noxious odors, and Tyler and Straughan (1970) required subjects to hold their breaths while imagining themselves eating fattening foods. R. A. Mann (1972) employed a contingency contracting procedure. Subjects deposited valuable personal belongings with him prior to treatment. These items were then returned or forfeited contingent on weekly weight change. Harris and Bruner (1971) employed a similar strategy in which money served as the reinforcer.

The procedures described above primarily entailed therapist-applied procedures. A variety of cognitive conditioning strategies have also been examined in an effort to facilitate generalization. One of the most frequently studied strategies is covert sensitization (e.g., Janda & Rimm, 1972; Manno & Marston, 1972; Sachs & Ingram, 1972). The client first imagines himself or herself eating inappropriately and then imagines some grossly aversive consequence, such as vomiting on the dinner table. Yet another approach that has been tested is coverant conditioning (e.g., Horan & Johnson, 1971; Horan, Baker, Hoffman, & Shute, 1975). The goal

of this procedure is to increase diet-relevant thoughts, including self-statements about the desirability of weight loss and the aversive qualities of obesity. The frequency of such self-statements is increased by having clients systematically practice reciting them and following the recitation with Premack reinforcers.

In general, the various conditioning approaches have yielded disappointing results. Although a few studies have achieved moderate success (e.g., Foreyt & Kennedy, 1971; Horan et al., 1975), no conditioning procedure has reliably produced acceptable weight losses with long-term maintenance. As a result, conditioning strategies have fallen out of favor. In fact, the most recent example we could find was a 1977 study in which a conditioning procedure served as a control condition (Hall, Hall, DeBoer, & O'Kulitch, 1977). It is possible that the various procedures have not been effective because they have not been appropriately applied. For example, most studies have used mildly aversive stimuli, short stimulus exposures, and brief treatment durations; certainly, the conditioning has not been extensive or intensive enough to overcome a life-long habit or food preference. On the other hand, as we described above, it now appears that obesity is a much more complex problem than the reinforcer balance conception suggests. Consequently, a treatment that focuses narrowly on response consequences is apt to be insufficient. Systematic conditioning regimens might play an important role as part of a comprehensive treatment program (e.g., by altering specific food preferences). However, it is highly unlikely that they can be sufficient treatments by themselves.

Antecedent Control. A second major hypothesis about the cause of obesity evolved from Schachter's (1971) "stimulus-bound" conception. According to this conception, the obese person not only eats too much but also eats improperly and eats in response to external stimuli (e.g., time of day, sight of food) rather than hunger *per se*. The most logical treatment strategy based on this conception is to alter the pattern of antecedent control and change eating habits, as opposed simply to altering volume of caloric intake by consequation procedures. That is, clients should be taught to eat slowly, take small bites, and eat only in response to internal hunger cues. As described above, the strategy for achieving this goal is a set of "stimulus control" procedures by which the client is taught to narrow the range of stimuli controlling eating. This stimulus control (SC) package has become the behavioral treatment strategy for obesity.

The SC package essentially consists of a set of instructions or guidelines that the client must follow on his or her own (e.g., "Do not eat after 9:00 P.M."). In most studies evaluating the package, the guidelines have been explained and discussed in 6–12 didactic group sessions. Basic information on nutrition, calorie values, and exercise are also typically presented, along with discussions of individual participant's progress and problems. This approach has been evaluated in numerous studies with mixed results. In two of the best controlled studies, Wollersheim (1970)

and Abrahms and Allen (1974) found the SC approach to be significantly more effective than several control conditions. Alternatively, Harris and Bruner (1971) and Penick, Filion, Fox, and Stunkard (1971), among others, did not find SC procedures to be effective.

An economical alternative to the group meeting format is bibliotherapy. An overview of the program is presented in one or two introductory sessions at which subjects receive written instructions and related material (e.g., calorie counters). All further subject–therapist contact is via telephone or mail. Typically, subjects regularly mail in progress reports and receive written feedback and suggestions. In general, these minimal-contact procedures have been as effective as programs requiring weekly group meetings (Bellack, Schwartz, & Rozensky, 1974; Hagen, 1974; Hanson, Borden, Hall, & Hall, 1976).

One reason that SC programs have not been found to be uniformly effective pertains to the fact that

> The SC package as described above consists of therapeutic instructions for self-modification. It does not seem likely that individuals suffering from a chronic dysfunction, such as obesity, in which reinforcement patterns and the behavioral repertoire facilitate current eating practices, would be able to lose weight simply on the basis of having received some new information. Rather, self- or externally imposed contingencies for application of new behaviors are undoubtedly necessary if behavior is to change. (Bellack, 1977, p. 14).

In fact, many of the successful programs included a variety of such supplemental procedures (e.g., self-monitoring, social reinforcement), albeit in an unsystematic fashion. In recognition of the need for such supplements, a variety of strategies have been systematically studied, including financial contingencies, self-monitoring, and self-reinforcement.

Two forms of financial-contingency procedures have been employed: therapist managed and self-administered. In the former, the therapist secures a financial deposit at the beginning of treatment. The money is refunded or forfeited throughout the intervention according to preset, therapist-determined criteria (e.g., $1 refunded per pound lost, $2 forfeited for any weight gain registered at the weekly group meeting). Several studies have found this to be an effective procedure that surprisingly, can improve posttreatment maintenance (Hall *et al.*, 1977; Jeffrey & Christensen, 1975). However, Rozensky and Bellack (1976) found a program of this type to have deleterious effects on some subjects (those high on self-control skill). Self-administered contingencies differ in that subjects determine their own reinforcement criteria and apply them, or not, at their own discretion. The therapist often retains a deposit, but the subject is free to redeem or forfeit money each week. The few investigations of this approach have reported positive results with moderate maintenance (Jeffrey, 1974; Mahoney, 1974; Mahoney, Moura, & Wade, 1973). Although, overall, both variations of this strategy have been somewhat effective, the results are no greater than those achieved by other simpler and more convenient approaches (e.g., social reinforcement, self-

monitoring). Financial contingencies can be of considerable value as a program supplement for a circumscribed subsample of obese individuals.

Self-monitoring (SM) is an almost universal component of behavioral programs. It serves a critical role in pretreatment assessment, to identify specific eating problems, as well as for tracking progress and identifying problems during treatment. Because SM is known to be reactive in a therapeutic direction (Kazdin, 1974), it has also been widely investigated as a therapeutic tool in obesity treatment. Several studies have found SM to be rather effective over short periods (e.g., 4 weeks) (Romanczyk, 1974; Romanczyk, Tracey, Wilson, & Thorpe, 1973). However, the effects appear to be short lived; SM groups have not been superior to control conditions over more extended durations (see Bellack, Rozensky, & Schwartz, 1974; Mahoney, 1974).

Standard SM procedure requires subjects to record their food consumption and/or eating behavior (e.g., meal duration) immediately after eating. As an alternative, Bellack and his colleagues (Bellack, Rozensky, & Schwartz, 1974; Bellack, Schwartz, & Rozensky, 1974; Rozensky & Bellack, 1976) instructed subjects to record their eating plan immediately before eating. It was expected that this procedure would interfere with automatic, stimulus-controlled eating. The approach was found to be highly effective in three separate studies. In contrast, Bellack (1976) achieved only moderate success with this procedure, and Green (1978) did not find preeating SM to be effective over a brief (4-week) treatment period. Further research on this approach seems warranted to determine its precise range of utility.

Yet another strategy for consequation is self-reinforcement (SR). Bellack (1976) reported highly significant findings for an SR procedure in which subjects assigned letter grades to each meal. Subjects kept an SM diary and wrote down a grade to reinforce (e.g., A or B) or punish (D or F) their eating behavior. In a subsequent study, Bellack, Glanz, and Simon (1976) successfully employed covert imagery as a reinforcer. Subjects reinforced appropriate eating by writing *thin* in a diary and generating positive dieting imagery (e.g., buying a dress in a smaller size). Inappropriate eating was punished by writing *fat* and generating aversive imagery.

Maintenance of Effects.   The research on behavioral treatments for obesity can be roughly divided into two phases. The first phase, which is represented by the material presented above, primarily focused on the development and testing of new treatment strategies. Treatment durations were brief (generally from 6 to 12 weeks), follow-up periods were minimal (also 6–12 weeks), and subjects were mostly young and only moderately overweight. The scores of studies conducted during this period demonstrated that the SC package, when supplemented by any of a number of additional procedures, could reliably produce weight losses of about 1–2 pounds per week that were maintained for brief periods after the end of treatment. This type of success is greater than what had been

achieved by other interventions, but was hardly striking. Subjects rarely achieved clinically meaningful weight losses or reached medically or individually determined goal weights. There was also no indication that weight losses were maintained for extended periods of time.

Judging by publication dates of articles in this area, this first phase appears to have ended in 1975–1976. Since that time, the focus of research has shifted to maintenance strategies and the continuation of weight loss after regular (i.e., weekly) treatment is completed. Since 1976, at least 12 studies have appeared in the behavioral literature in which follow-up periods have ranged from 6 to 12 months after treatment. A variety of strategies have been examined in an effort to protract the effects of treatment, including booster sessions (Hall, Bass, & Monroe, 1978; Kingsley & Wilson, 1977), fading therapist contact (Carter, Rice, & DeJulio, 1977), and involving family members in the treatment (Brownell, Heckerman, Westlake, Hayes, & Monti, 1978; Wilson & Brownell, 1978).

These studies have uniformly found variations of the SC approach to be effective during the initial treatment period, thus underscoring the ability of that approach to reliably produce weight losses of 1–2 pounds per week. However, the results for maintenance have been inconsistent and mystifying. No procedure has reliably produced continued weight losses after active treatment has been terminated. Furthermore, posttreatment differences between treated and control groups have frequently disappeared by 6–12 months after treatment (Kelly & Curran, 1976; Kingsley & Wilson, 1977; Ost & Gotestam, 1976). On the other hand, several studies have reported excellent maintenance (Beneke, Paulsen, McReynolds, & Lutz, 1978; Brownell et al., 1978; Carter et al., 1977). Also, even when treated versus control group differences have evaporated by follow-up, treated subjects have maintained their losses reasonably well; apparently, many control subjects eventually manage to lose some weight.

Given the pattern of results that has emerged, any overall evaluation must remain "in the eye of the beholder." The general behavioral approach is consistently effective in producing moderate weight losses in moderately overweight individuals with reasonable maintenance. The approach has not been shown to be adequate for producing the substantial losses required in the treatment of the grossly obese patient (e.g., more than 100 pounds overweight) or for bringing the moderately overweight patient to medically desirable goal weights (Stunkard & Penick, 1979).

Some General Considerations.   Several other issues must be considered before concluding this section. First, the SC package is designed to modify a number of specific eating patterns, not simply to reduce caloric intake. It is generally assumed that weight loss in a SC program is a function of the degree to which subjects follow the guidelines and alter their behavior. This has not been found to be the case! With few exceptions (Hagen, 1974; Wollersheim, 1970), weight loss has not been found

to be highly correlated with self-reported habit change (see Bellack, Rozensky, & Schwartz, 1974; Brownell *et al.*, 1978; Jeffery, Wing, & Stunkard, 1978). Many subjects do not comply with the program directives and still lose weight, whereas others comply and fail to lose. This phenomenon potentially has serious implications for the behavioral approach. For example, there might well be some critical factors in obesity, and its treatment, that have not been adequately considered, such as insufficient calorie expenditure (rather than excess consumption) and biological "set point" (Nisbett, 1972). Alternatively, some unidentified aspect of the behavioral procedure, such as expectancy effects and therapist reinforcement, might actually be the critical change agent. This issue must be resolved before any firm conclusions about the approach can be reached and before substantial improvements can be made.

Behavior therapists have approached obesity (and overeating) as if it were a compartmentalized habit disorder, not affecting and not being affected by other aspects of the patient's life. This is a conceptual and tactical error. For many people, eating is intimately tied up with negative emotions, including boredom and anxiety. For others, it is associated with positive emotions and celebration. Both the inclination and the ability to abstain (i.e., to diet) is affected by mood and a variety of life events. Few people will attempt to resist or be able to resist an urge to eat after a fight with a spouse, rejection by a lover, or a financial setback. Essentially, how many people care about losing 5–10 pounds when they are depressed or enraged? Unfortunately, many people with weight problems (many people in general) move through life from one such problem to another, from one aversive mood to another. They can follow the program for a few days or weeks and then are thrown off course by some life event. The standard behavioral package, especially when administered in a group format, seems woefully weak under these circumstances. Not only must the treatment be improved, but it must be integrated with other treatment procedures to deal with any associated problems.

Patients requesting treatment for obesity must be viewed in the same context as patients requesting treatment for phobias, compulsions, or "existential crises." The clinician must conduct a thorough and broad based assessment that goes beyond the reported complaint. Similarly, the recommended treatment plan must be geared to the patient's overall level and style of adjustment, behavioral assets and deficits, and so forth.

ANOREXIA NERVOSA

Nature of the Disorder

Anorexia nervosa is one of the most perplexing and dangerous of disorders. It can be loosely defined as self-starvation. The primary symptom is a dramatic, self-determined decrease in food consumption gener-

ally leading to gross weight loss with serious health hazards. Malnutrition is common, and mortality estimates range from 3 to 25%. Thus, anorexia nervosa is a disorder that has serious, life-threatening consequences.

A diverse set of physical and behavioral symptoms have been associated with anorexia, and it has defied easy definition and analysis. One of the most widely accepted categorizations is the research diagnostic criteria provided by Feighner, Robins, Guze, Woodruff, Winokur, and Munoy (1972). As illustrated in Table I, anorexia is generally categorized by a weight loss of 25% or more of body weight, occurring before the age of 25, with no physical cause. Some 85–95% of anorectics are women, and one of the primary symptoms is amenorrhea (cessation of menstruation). In fact, occurrence of amenorrhea is often viewed as necessary for diagnosis of anorexia.

A number of other symptoms are also commonly reported. Anorectics are often characterized as hyperactive; they enjoy and engage extensively in exercise and other physical activity. They also reportedly have distorted self-perception, generally viewing themselves as overweight even when they are emaciated. In a related manner, they often exhibit an irrational concern about being overweight that manifests itself as a phobialike reaction. Yet another frequent symptom is bulimia—bouts of extensive gorging or binge eating, typically followed by self-induced vomiting. This latter symptom is illustrative of the fact that anorectics do not "lose their appetites" or have food aversions. Rather, they frequently are obsessed with food and eating; they talk about it, often like cooking for others, and have eating binges. Their pattern of extreme abstinence is

TABLE I. CRITERIA REQUIRED FOR DIAGNOSING ANOREXIA NERVOSA

A. Age of onset prior to 25.

B. Anorexia with accompanying weight loss of at least 25% of original body weight.

C. A distorted, implacable attitude toward eating, food, or weight that overrides hunger, admonitions, reassurance and threats; e.g., (1) denial of illness with a failure to recognize nutritional needs, (2) apparent enjoyment in losing weight with overt manifestation that food refusal is a pleasurable indulgence, (3) a desired body image of extreme thinness with overt evidence that it is rewarding to the patient to achieve and maintain this state, and (4) unusual hoarding or handling of food.

D. No known medical illness that could account for the anorexia and weight loss.

E. No other known psychiatric disorder with particular reference to primary affective disorders, schizophrenia, and obsessive-compulsive or phobic neurosis. (The assumption is made that even though it may appear phobic or obsessional, food refusal alone is not sufficient to qualify for obsessive-compulsive or phobic disease.)

F. At least two of the following manifestations: (1) amenorrhea, (2) lanugo, (3) bradycardia (persistent resting pulse of 60 or less), (4) periods of overactivity, (5) episodes of bulimia, (6) vomiting (may be self-induced).

Note. From "Diagnostic Criteria for Use in Psychiatric Research," by J. P. Feighner, E. Robins, S. B. Guze, R. A. Woodruff, Jr., G. Winokur, and T. Munoy, *Archives of General Psychiatry,* 1972, 26, 57–63. Reprinted by permission of the authors.

apparently stimulated by other factors, including, but not limited to, fear of being overweight.

Anorexia is also typically associated with family distress (Bemis, 1978), although it is not a symptom *per se.* Mothers of anorectics are frequently described as cold, domineering, and rejecting. Parental conflict with the patient, especially about eating, is frequently encountered. Although it is unclear whether or not this source of distress predates the anorexia (Hersen & Detre, in press), anecdotal reports describe long-standing family histories of battles over eating and weight gain (initial parental complaints about excess weight, ultimately followed by complaints of insufficient weight).

Given the variety of symptoms, it should not be surprising that the source or cause of the disorder is the subject of considerable controversy. The predominant psychodynamic view holds that refusal to eat is an act of self-determination and an attempt to establish a sense of personal identity as a reaction to an overly domineering mother (Bruch, 1973). Of course, this type of conjecture has minimal empirical support and is impossible to refute. Anorexia has also been hypothesized to be a predominantly physiological dysfunction (Bemis, 1978). Though many of the physical symptoms appear to be sequelae of malnutrition, others do not. Most notably, amenorrhea frequently appears before any gross restriction of food intake (Halmi, 1974). On the other hand, normal menstruation frequently resumes when normal eating patterns are reinstated, a result that would not be expected if the disorder had some physiological substrate (e.g., a hypothalamic dysfunction).

Although behavioral treatment strategies have been singularly effective in treating anorexia (see Kellerman, 1977), there is no systematic behavioral conception of its etiology. It has primarily been viewed simply as an operant response, with social reinforcement (i.e., attention) the most likely maintaining factor. This hypothesis draws support primarily from the success of operant procedures in quickly reinstating relatively normal eating behavior. This convergent validational support is encouraging, but it is far from sufficient. Successful treatment cannot substantiate causal models; independent etiological research must be conducted for this purpose.

Treatment of Anorexia Nervosa

A variety of treatment approaches have been employed with anorectics, including psychoanalysis and other verbal psychotherapies, various psychotropic medications, family therapy, and force-feeding (Bemis, 1978). Although occasional successes have been reported, none of these procedures has been generally effective. In contrast, behavioral strategies have consistently been found to be highly effective. Numerous single-case studies have been reported in which various operant strategies have

rapidly reinstated eating and produced significant weight gain (Kellerman, 1977).

The general strategy entails hospitalizing the patient, ignoring complaints about food and weight, and reinforcing either eating or weight gain. For example, Blinder, Freeman, and Stunkard (1970) used exercise as a reinforcer; access to exercise was made contingent on a daily weight gain of ½ pound. Halmi, Powers, and Cunningham (1975) restricted patient access to a variety of social and activity reinforcers, including visitors, phone calls, and mail. Access to these various reinforcers was made contingent on a weight gain of 1.1 pounds every 5 days. Agras, Barlow, Chapin, Abel, and Leitenberg (1974) examined the role of feedback as well as reinforcement. In various phases of the design, the patient was either reinforced for weight gain or given feedback about the number of calories consumed and self-monitored mouthfuls eaten and weight gain in addition to reinforcement. Agras *et al.* concluded that the combination of reinforcement and feedback was more effective than reinforcement alone.

Numerous reports of the successful use of such operant procedures have appeared in the literature. Treatment generally has been effective within a few days, thus circumventing the need for forced feeding and, of course, saving lives. However, several issues remain unresolved. First, because of the relatively low incidence of anorexia, no group outcome studies have been conducted. The single-case designs employed do not allow for a comparison of diverse strategies or specification of the circumstances in which operant strategies are and are not effective. Second, the durability of behavioral treatments is uncertain. Anorexia is known to have a long and invidious course, with relapses common up to several years after discharge (Bemis, 1978). Although there are some long-term follow-ups of behavioral successes (e.g., Bhanji & Thompson, 1974; Brady & Rieger, 1975), the results are inconsistent at best.

Though further research is required to systematically evaluate the long-term impact of behavioral treatments, it seems unlikely to us that the types of operant strategies that have been employed could reliably produce durable changes. Such procedures do not deal with the etiological factors that produced the disordered eating or the extrahospital factors that maintained it. As long as those factors persist, relapse should be predicted, not viewed as an infrequent surprise.

Hersen and Detre (in press) have proposed a comprehensive treatment strategy for anorexia that appears to be much more likely to prevent relapse. The program contains five discrete components:

1. *Weight loss.* The first aspect of the program is to hospitalize the patient and institute an operant program (as described above) to initiate weight gain. Reinforcement (primarily privileges) and feedback are provided for appropriate eating and weight gain; complaints and resistance are ignored.

2. *Attitudes toward food and weight.* In an effort to deal with the "weight phobia," systematic desensitization is implemented, with hierarchies focusing on weight gain and food consumption.

3. *Bulimia.* In many cases, bulimic episodes appear to be induced by overwhelming impulses to eat, which are reduced by the binge. Treatment for this particular problem entails flooding combined with response prevention. The patient is exposed to problem foods (including touching and tasting) but is prevented from binging or inducing vomiting. Exposure continues until the impulse to binge is dissipated.

4. *Family therapy.* The focus of this component of treatment is not to remediate the supposed family etiological factors but rather to teach parents to more effectively manage the patient, especially in regard to eating. Contracting and positive reinforcement are emphasized.

5. *Long-term maintenance.* Treatment is not assumed to be restricted to the few weeks of hospitalization. Booster sessions for the patient and the family are recommended at least 6–12 times per year, with rehospitalization suggested if the patient ever loses 15% of body weight. This program should be continued for a period of up to 5 years.

This program has not yet been empirically evaluated. Because of the low incidence of anorexia it will be extremely difficult to conduct either an analysis of the entire package or a systematic dismantling to determine which (if any) of the elements are critical. However, we strongly advocate its clinical application while empirical data are gradually collected.

SUMMARY

In this chapter we have reviewed the nature and treatment of the two major eating disorders: obesity and anorexia nervosa. We first discussed the various nonbehavioral approaches for treating obesity and concluded that none were both effective and safe. The behavioral conception of obesity was then discussed, followed by a brief description of primary treatment strategies. A review of the empirical literature on behavioral treatments suggested that procedures to alter the consequences of eating have not been especially effective, whereas those aimed at antecedent control have consistently produced positive results. However, weight losses have been modest, with only moderate long-term maintenance. Current behavioral approaches do not seem to be sufficient for producing extensive weight losses.

Anorexia nervosa was described as a poorly understood, life-threatening disorder the primary symptom of which is self-starvation. Behavioral treatments have emphasized operant control of eating and have been highly effective in quickly producing weight gain. However, multicomponent, long-term treatment appears to be necessary to forestall relapses. A prototype program was presented.

REFERENCES

Abrahms, J., & Allen, G. Comparative effectiveness of situational programming, financial pay-offs and group pressure in weight reduction. *Behavior Therapy*, 1974, *5*, 391–400.

Abramson, E. E. A review of behavioral approaches to weight control. *Behaviour Research and Therapy*, 1973, *11*, 547–546.

Abramson, E. E. Behavioral approaches to weight control: An updated review. *Behaviour Research and Therapy*, 1977, *15*, 355–364.

Agras, W. S., Barlow, D. H., Chapin, H. N., Abel, G. G., & Leitenberg, H. Behavior modification of anorexia nervosa. *Archives of General Psychiatry*, 1974, *30*, 279–286.

Barlow, D. H., & Tillotson, J. L. Behavioral science and nutrition: A new perspective. *Journal of the American Dietetic Association*, 1978, *72*, 368–371.

Bellack, A. S. Behavior therapy for weight reduction: An evaluative review. *Addictive Behaviors*, 1975, *1*, 73–82.

Bellack, A. S. A comparison of self-monitoring and self-reinforcement in weight reduction. *Behavior Therapy*, 1976, *7*, 68–75.

Bellack, A. S. Behavioral treatment for obesity: Appraisal and recommendations. In M. Hersen, R. M. Eisler, & P. M. Miller (Eds.), *Progress in behavior modification* (Vol. 4). New York: Academic Press, 1977.

Bellack, A. S., Rozensky, R. H., & Schwartz, J. A comparison of two forms of self-monitoring in a behavioral weight reduction program. *Behavior Therapy*, 1974, *5*, 523–530.

Bellack, A. S., Schwartz, J., & Rozensky, R. The contribution of external control in a weight reduction program. *Journal of Behavior Therapy and Experimental Psychiatry*, 1974, *5*, 245–250.

Bellack, A. S., Glanz, L. M., & Simon, R. Self-reinforcement style and covert imagery in the treatment of obesity. *Journal of Consulting and Clinical Psychology*, 1976, *44*, 490–491.

Bemis, K. M. Current approaches to the etiology and treatment of anorexia nervosa. *Psychological Bulletin*, 1978, *85*, 593–617.

Beneke, W. M., Paulsen, B., McReynolds, W. T., & Lutz, R. N. Long-term results of two behavior modification weight loss programs using nutritionists as therapists. *Behavior Therapy*, 1978, *9*, 501–507.

Bhanji, S., & Thompson, J. Operant conditioning in the treatment of anorexia nervosa. A review and retrospective study of 11 cases. *British Journal of Psychiatry*, 1974, *124*, 166–172.

Blinder, B. J., Freeman, D. M. A., & Stunkard, A. J. Behavioral therapy of anorexia nervosa: Effectiveness of activity as a reinforcer of weight gain. *American Journal of Psychiatry*, 1970, *126*, 1093–1098.

Bloom, W. L., & Eidex, M. F. Inactivity as a major factor in adult obesity. *Metabolism: Clinical and Experimental*, 1967, *14*, 679–684.

Brady, J. P., & Rieger, W. Behavioral treatment of anorexia nervosa. In T. Thompson & W. S. Dockens (Eds.), *Applications of behavior modification: International symposium on behavior modification at Minneapolis, 1972.* New York: Academic Press, 1975.

Brightwell, D. R., & Sloan, C. L. Long-term results of behavior therapy for obesity. *Behavior Therapy*, 1977, *8*, 898–905.

Brownell, K. D., Heckerman, C. L., Westlake, R. J., Hayes, S. C., & Monti, P. M. The effect of couples training and partner co-operativeness in the behavioral treatment of obesity. *Behaviour Research and Therapy*, 1978, *16*, 323–333.

Bruch, H. Psychological aspects of overeating and obesity. *Psychosomatics*, 1964, *5*, 269–274.

Bruch, H. *Eating disorders: Obesity, anorexia nervosa, and the person within.* New York: Basic Books, 1973.

Carrera, F. Obesity in adolescence. *Psychosomatics*, 1967, *8*, 342–349.

Carter, E. N., Rice, A. P., & DeJulio, S. Role of the therapist in the self-control of obesity. *Journal of Consulting and Clinical Psychology*, 1977, *45*, 503.

Chirico, A., & Stunkard, A. J. Physical activity and human obesity. *New England Journal of Medicine*, 1966, *10*, 935–940.

Chlouverakis, C. Dietary and medical treatments of obesity: An evaluative review. *Addictive Behaviors*, 1975, *1*, 3–22.

Coates, T. J. Theory, research, and practice in treating obesity: Are they really all the same? *Addictive Behaviors*, 1977, *2*, 95–103.

Cooper, K. H. *The new aerobics.* New York: Bantam Books, 1977.

Edison, G. R. Amphetamines: A dangerous illusion. *Annals of Internal Medicine*, 1971, *74*, 605–610.

Feighner, J. P., Robins, E., Guze, S. B., Woodruff, R. A., Jr., Winokur, G., & Munoy, T. Diagnostic criteria for use in psychiatric research. *Archives of General Psychiatry*, 1972, *26*, 57–63.

Feinstein, A. R. The treatment of obesity: An analysis of methods, results, and factors which influence success. *Journal of Chronic Diseases*, 1960, *11*, 349–393.

Ferster, C. B., Nurnberger, J. I., & Levitt, E. B. The control of eating. *Journal of Mathetics*, 1962, *1*, 87–109.

Fischer, N. Obesity, affect, and therapeutic starvation. *Archives of General Psychiatry*, 1967, *17*, 227–233.

Foreyt, J. P. Obesity. In R. Williams & D. Gentry (Eds.), *Behaviour approaches to medical treatment*, Cambridge, England: Bollinger, 1977.

Foreyt, J. P., & Kennedy, W. A. Treatment of overweight by aversion therapy. *Behaviour Research and Therapy*, 1971, *9*, 29–34.

Ganong, W. F. *Review of medical physiology.* Los Altos, Calif: Lange Medical Publications, 1975.

Green, L. Temporal and stimulus factors in self-monitoring by obese persons. *Behavior Therapy*, 1978, *9*, 328–341.

Hagen, R. L. Group therapy vs. bibliotherapy in weight reduction. *Behavior Therapy*, 1974, *5*, 222–234.

Hall, S. M., & Hall, R. G. Outcome and methodological considerations in the behavioral treatment of obesity. *Behavior Therapy*, 1974, *5*, 352–364.

Hall, S. M., Hall, R. G., DeBoer, G., & O'Kulitch, P. Self-management, external management and self and external management combined compared with psychotherapy in the control of obesity. *Behaviour Research and Therapy*, 1977, *15*, 89–96.

Hall, S. M., Bass, A., & Monroe, J. Continued contact and monitoring as follow-up strategies: A long-term study of obesity treatment. *Addictive Behaviors*, 1978, *3*, 139–147.

Halmi, K. A. Anorexia nervosa: Demographic and clinical features in 94 cases. *Psychosomatic Medicine*, 1974, *36*, 18–25.

Halmi, K. A., Powers, P., & Cunningham, S. Treatment of anorexia nervosa with behavior modification. *Archives of General Psychiatry*, 1975, *32*, 93–95.

Hanson, R. W., Borden, B. L., Hall, S. M., & Hall, R. G. Use of programmed instruction in teaching self-management skills to overweight adults. *Behavior Therapy*, 1976, *7*, 366–373.

Harris, M. B. & Bruner, C. G. A comparison of a self-control and a contract procedure for weight control. *Behaviour Research and Therapy*, 1971, *9*, 347–354.

Hersen, M., & Detre, T. The behavioral psychotherapy of anorexia nervosa. In T. B. Karasan & L. Bellak (Eds.), *Handbook of specialized techniques in individual psychotherapy.* New York: Brunner/Mazel, in press.

Horan, J. J., & Johnson, R. G. Coverant conditioning through a self-management application of the Premack principle: Its effect on weight reduction. *Journal of Behavior Therapy and Experimental Psychiatry*, 1971, *2*, 243–249.

Horan, J. J., Baker, S. B., Hoffman, A. M., & Shute, R. E. Weight loss through variations in the coverant control paradigm. *Journal of Consulting and Clinical Psychology*, 1975, *43*, 68–72.

Janda, L. W., & Rimm, D. C. Covert sensitization in the treatment of obesity. *Journal of Abnormal Psychology*, 1972, *80*, 37–42.

Jeffery, R. W., Wing, R. R., & Stunkard, A. J. Behavioral treatment of obesity: The state of the art 1976. *Behavior Therapy*, 1978, *9*, 189–199.

Jeffrey, D. B. A comparison of the effects of external control and self-control on the modification and maintenance of weight. *Journal of Abnormal Psychology*, 1974, *83*, 404–410.

Jeffrey, D. B., & Christensen, E. R. Behavior therapy versus "will power" in the management of obesity. *Journal of Psychology*, 1975, *90*, 303–311.

Jordan, H. A., & Levitz, L. S. Behavior modification in a self-help group. *Journal of the American Dietetic Association*, 1973, *62*, 27–29.

Kau, M. L., & Fischer, J. Self-modification of exercise behavior. *Journal of Behavior Therapy and Experimental Psychiatry*, 1974, *5*, 213–214.

Kazdin, A. E. Self-monitoring and behavior change. In M. J. Mahoney & C. E. Thoresen (Eds.), *Self-control: Power to the person.* Monterey, Calif.: Brooks/Cole, 1974.

Kellerman, J. Anorexia nervosa: The efficacy of behavior therapy. *Journal of Behavior Therapy and Experimental Psychiatry*, 1977, *8*, 387–390.

Kelly, A. H., & Curran, J. P. Comparison of a self-control approach and an emotional coping approach to the treatment of obesity. *Journal of Consulting and Clinical Psychology*, 1976, *44*, 683.

Kingsley, R. G., & Wilson, G. T. Behavior therapy for obesity: A comparative investigation of long-term efficacy. *Journal of Consulting and Clinical Psychology*, 1977, *45*, 288–298.

Kornhaber, A. Group treatment of obesity. *General Practice*, 1968, *38*, 116–120.

Leon, G. R. Current directions in the treatment of obesity. *Psychological Bulletin*, 1976, *83*, 557–578.

Levitz, L., & Stunkard, A. A therapeutic coalition for obesity: Behavior modification and patient self-help. *American Journal of Psychiatry*, 1974, *131*, 423–427.

Mahoney, M. J. Self-reward and self-monitoring techiques for weight control. *Behavior Therapy*, 1974, *5*, 48–57.

Mahoney, M. J. The obese eating style: Bites, beliefs, and behavior modification. *Addictive Behaviors*, 1975, *1*, 47–53.

Mahoney, M. J., & Caggiula, A. W. Applying behavioral methods to nutritional counseling. *Journal of the American Dietetic Association*, 1978, *72*, 372–377.

Mahoney, M. J., Moura, N., & Wade, T. The relative efficacy of self-reward, self-punishment and self-monitoring techniques. *Journal of Consulting and Clinical Psychology*, 1973, *40*, 404–407.

Mann, G. V. The influence of obesity on health, *New England Journal of Medicine*, 1974, *24*, 178–186.

Mann, R. A. The behavior therapeutic use of contingency contracting to control an adult behavior problem: Weight control. *Journal of Applied Behavior Analysis*, 1972, *5*, 99–109.

Manno, B., & Marston, A. R. Weight reduction as a function of negative covert reinforcement (sensitization) vs positive covert reinforcement. *Behaviour Research and Therapy*, 1972, *10*, 201–208.

Mayer, J. Inactivity as a major factory in adolescent obesity. *Annals of the New York Academy of Sciences*, 1965, *131*, 502–506.

Neill, J. R., Marshall, J. R., & Yale, C. E. Marital changes after intestinal bypass surgery. *Journal of the American Medical Association*, 1978, *240*, 447–450.

Nisbett, R. E. Hunger, obesity, and the ventromedial hypothalamus. *Psychological Review*, 1972, *79*, 433–453.

Ost, L., & Gotestam, K. G. Behavioral and pharmacological treatments for obesity: An experimental comparison. *Addictive Behaviors*, 1976, *1*, 331–338.

Penick, S. B., Filion, R., Fox, S., & Stunkard, A. J. Behavior modification in the treatment of obesity. *Psychosomatic Medicine*, 1971, *33*, 49–55.

Rodin, J. Bidirectional influences of emotionality, stimulus responsivity, and metabolic events in obesity. In J. D. Moser & M. E. P. Selegman (Eds.), *Psychopathology: Experimental models.* San Francisco: W. H. Freeman, 1977.

Romanczyk, R. G. Self-monitoring in the treatment of obesity: Parameters of reactivity. *Behavior Therapy*, 1974, *5*, 531–540.

Romanczyk, R. G., Tracey, D., Wilson, G. T., & Thorpe, G. Behavioral techniques in the treatment of obesity: A comparative analysis. *Behaviour Research and Therapy*, 1973, *11*, 629–640.

Rozensky, R. H., & Bellack, A. S. Individual differences in self-reinforcement style and performance in self- and therapist-controlled weight reduction programs. *Behaviour Research and Therapy*, 1976, *14*, 357–364.

Sachs, L., & Ingram, G. Covert sensitization as a treatment for weight control. *Psychological Reports*, 1972, *30*, 971–974.

Schachter, S. Some extraordinary facts about obese humans and rats, *American Psychologist*, 1971, *26*, 129–144.

Schachter, S., & Rodin, J. *Obese humans and rats.* Hillsdale, N.J.: Lawrence Erlbaum, 1974.

Seltzer, C. C., & Mayer, J. A simple criterion of obesity. *Postgraduate Medicine*, 1965, *38*, 101–107.

Slawson, P. F. Group psychotherapy with obese women. *Psychosomatics*, 1965, *6*, 206–209.

Stalonas, P. M., Johnson, W. G., & Christ, M. Behavior modification for obesity: The evaluation of exercise, contingency management, and program adherence. *Journal of Consulting and Clinical Psychology*, 1978, *46*, 463–469.

Stollak, G. E. Weight loss obtained under different experimental procedures. *Psychotherapy: Theory, Research and Practice*, 1967, *4*, 61–64.

Stuart, R. B., & Davis, B. *Slim chance in a fat world.* Champaign, Ill.: Research Press, 1972.

Stunkard, A. J. The management of obesity. *New York Journal of Medicine*, 1958, *58*, 79–87.

Stunkard, A. J. Obesity and the denial of hunger. *Psychosomatic Medicine*, 1959, *21*, 281–289.

Stunkard, A. J., & McLaren-Hume, H. M. The results of treatment for obesity. *Archives of Internal Medicine*, 1959, *103*, 79–85.

Stunkard, A. J., & Penick, S. B. Behavior modification in the treatment of obesity. *Archives of General Psychiatry*, 1979, *36*, 801–806.

Stunkard, A. J., & Rush, J. Dieting and depression re-examined: A critical review of reports of untoward responses during weight reduction for obesity. *Annals of Internal Medicine*, 1974, *81*, 526–533.

Stunkard, A. J., Levine, H., & Fox, S. The management of obesity. *Archives of Internal Medicine*, 1970, *125*, 1067–1072.

Tyler, V., & Straughan, J. H. Coverant control and breath holding as techniques for the treatment of obesity. *Psychological Record*, 1970, *20*, 473–478.

Walen, S., Hauserman, N. M., & Lavin, P. J. *Clinical guide to behavior therapy.* Baltimore: Williams & Wilkins, 1977.

Wick, E., Sigman, R., & Kline, M. V. Hypnotherapy and therapeutic education in the treatment of obesity: Differential treatment factors. *Psychiatric Quarterly*, 1971, *45*, 234–254.

Wilson, G. T. Methodological considerations in treatment outcome research in obesity. *Journal of Consulting and Clinical Psychology*, 1978, *46*, 687–702.

Wilson, G. T., & Brownell, K. D. Behavior therapy for obesity: Including family members in the treatment process. *Behavior therapy*, 1978, *9*, 943–945.

Wollersheim, J. P. Effectiveness of group therapy based upon learning principles in the treatment of overweight women. *Journal of Abnormal Psychology*, 1970, *76*, 462–474.

Wysocki, T., Hall, G., Iwata, B., & Riordan, M. Behavioral management of exercise: Contracting for aerobic points. *Journal of Applied Behavior Analysis*, 1979, *12*, 55–64.

Urological Disorders

DANIEL M. DOLEYS AND RONALD L. MEREDITH

ENURESIS

Definition and Incidence

Of all the urological disorders, functional nocturnal enuresis is the one most frequently seen by psychologists. Functional nocturnal enuresis can be defined as persistent wetting of the bed in the absence of urological or neurological pathology (Doleys, 1977, 1978). Specific agreement on the age at which a child can be considered enuretic has not been achieved; however, most estimates vary from 3 to 5 years of age. Muellner (1960a,b) suggested that urinary control should be established by the age of 3. In most cases, treatment is not applied to children under the age of 5 (see Doleys, 1977). It has been estimated that nearly 20% of 5-year-olds wet their beds frequently enough to be considered enuretic (Lovibond & Coote, 1970; Oppel, Harper, & Rider, 1968). These statistics change with age, showing that approximately 5% of 10-year-olds and 2% of 12- to 14-year-olds are enuretic.

Approximately 80% of enuretic children are considered primary or continuous enuretics. That is, they have not experienced continence for a period of 6 months or more (deJonge, 1973). Those children who have demonstrated continence for a sustained period of time are referred to as secondary, discontinuous, or acquired enuretics. Although the "spontaneous" rate of remission appears to be significant, guidelines have yet to be developed to determine which of the many children who are wetting

DANIEL M. DOLEYS • Program Director, Behavioral Programs, and RONALD L. MEREDITH • Vaughan Clinic, Brookwood Medical Center, Birmingham, Alabama 35209.

at 5 years of age will continue to be enuretic when they reach age 12. Experience has indicated the utility of treating the child at a younger age rather than allowing the behavior to become more firmly established. Additionally, there is reason to believe that many of those children who do become dry accomplish this through unplanned and unsystematically applied treatments generated by the parents. Humiliation and embarrassment involving the enuretic's peers might also be contributing factors.

Physiology of Micturition

Adequate assessment of the enuretic child demands some knowledge of the physiology involved. Yeates (1973) outlined the following 5 steps as a description of the functioning of the mature bladder: (1) the bladder fills by flow of urine into the bladder from the kidneys via the ureters; (2) the desire to void is initiated by stretching and relaxation of the detrusor muscle surrounding the bladder; (3) voiding is inhibited by maintaining pressure on the sphincter muscle and by perineal pressure; (4) the onset of voiding following bladder fullness is a result of rhythmical contractions of the bladder; and (5) sustained bladder contractions and sphincter relaxation are maintained until the bladder is empty (Muellner, 1951; Yeates, 1973).

Four developmental stages have been outlined as comprising the acquisition of mature bladder functioning (Muellner, 1960a,b): (1) demonstrated awareness of bladder fullness (1–2 years of age); (2) ability to retain urine voluntarily (3 years of age); (3) capacity to start and stop the flow of urine in midstream (4.5 years); and (4) ability to initiate and terminate the flow of urine at any degree of bladder fullness (approximately 5 years of age).

Adequate assessment of children presenting with the problem of enuresis should include evaluation of these various factors. A detailed description of such an evaluation process and a proposed model for classification of enuretics based on such assessment data has been presented elsewhere (Doleys, Schwartz, & Ciminero, 1981).

Etiology

Considerable space has been devoted to the discussion of potential etiological factors (Doleys, 1977, 1978, 1979; Doleys et al., 1981; Shaffer, 1977; Walker, 1978). Sleep has been indicted as one of the causative factors in enuresis. Although several researchers have discussed enuresis as an arousal disorder (Finley, 1971; Perlmutter, 1976; Ritvo, Ornitz, Gottlieb, Poussaint, Maron, Ditman, & Blinn, 1969), recent data have not been supportive of this conceptualization (Mikkelsen, Rapoport, Nee, Gruenau, Mendelson, & Gillin, 1980). Mikkelsen et al. (1980) were unable to find any systematic association between enuresis and stage of

sleep. Furthermore, "disturbed" and "nondisturbed" enuretics did not display differential distributions of nighttime wetting across various sleep stages. One confusing aspect of investigations surrounding sleep is the differentiation of sleep as determined by electroencephalographic (EEG) pattern and the more commonly observed behavioral measure of arousability. Some children, regardless of the depth of sleep as measured by EEG patterns, are very difficult to arouse. Data comparing enuretics with nonenuretics on the dimension of arousability are conflicting (Bostack, 1958; Boyd, 1960; Braithwaithe, 1956; Kaffman & Elizur, 1977).

Psychological factors have also been purused as having a causative relationship to enuresis. This approach has been particularly noticeable within psychodynamic and psychoanalytic models (Pierce, 1972; Sperling, 1965). There is little systematic evidence, however, to support the contentions suggesting enuresis to be a result of some underlying conflict, anxiety or emotional stress. Although there appears to be some correlation between behavioral disturbance and enuresis in girls, whether or not the disturbance preceded or followed the onset of enuresis has not been resolved (Werry, 1967). Such theorizing would logically predict symptom substitution in cases where treatment is successful. This has not been documented in studies where it has been examined (Baker, 1969; Dische, 1971; Werry & Cohrssen, 1965).

The role of genetics in enuresis continues to be a topic of discussion. It is clear that there is a much higher incidence of enuresis among children and families where both parents were enuretic as compared to where only one or neither parent was enuretic (77% vs. 44% vs. 15%). In addition, higher concordance rates for enuresis are found among monozygotic than among dizygotic twins. These findings, of course, are open to a variety of interpretations, and their meaningfulness for the selection and efficacy of treatment continued to be questionable (Bakwin, 1973; Cohen, 1975; Faray, 1935).

Some studies (Esperanca & Gerrard, 1969; Starfield, 1967; Zaleski, Gerrard, & Shokeir, 1973) have implicated bladder capacity as a factor in enuresis. The data collected by these researchers suggest that enuretics have a smaller functional bladder capacity (FBC) than nonenuretics. This reduced FBC is supposedly a result of inadequate cortical inhibition over afferent bladder stimuli, which might be a part of a developmental delay, or indicative of an allergenic reaction where the bladder is maintained in spasm, preventing it from accommodating larger volumes of urine (Zaleski, Shokeir, & Gerrard, 1972). Rutter (1973), however, notes that there is considerable overlap in the FBC of enuretics and nonenuretics of the same age level. Rutter speculates that a small FBC might be a compensatory response resulting from inadequate stretching by dilatation of the bladder at nighttime.

The learning-behavioral model attributes nocturnal enuresis to a habit deficiency, inadequate learning experiences, and inappropriate reinforcement contingencies (Atthowe, 1973; Lovibond & Coote, 1970;

Young, 1965b). Bladder fullness within this model is interpreted as a stimulus that, in the continent child, has acquired discriminative properties. Bladder fullness, therefore, results in the occurrence of an inhibitory response that postpones voiding until the proper time and place or results in awakening the child from sleep so that proper toileting can occur. Several conditioning-based procedures have emanated from this model. Perhaps the most notable has been the bell-and-pad, or urine alarm, procedure originally described by Mowrer and Mowrer (1938). More recently, Azrin, Sneed, and Foxx (1973, 1974) have proposed a procedure they refer to as dry-bed training (DBT).

Assessment

A complete and thorough assessment should be undertaken with each case. Although space does not allow a detailed discussion of the assessment procedures for enuresis, this can be found elsewhere (Ciminero & Doleys, 1976; Doleys, 1979; Doleys et al., 1981). Briefly, assessment should involve a clinical interview that should gain information regarding (a) history and description of the problem, (b) family and medical history, (c) other problems in the family or with the child, (d) home and family environment, and (e) previous treatment attempts. Pattern of enuretic behavior should be examined and information collected regarding (a) nighttime or nocturnal patterns, (b) daytime or diurnal patterns, and (c) bladder capacity. The assessment and evaluation phase can extend anywhere from 1 to 4 weeks. Although this might seem to be time consuming, it does allow for a more detailed evaluation of the child's current functioning and assessment of the parents' and child's motivations and abilities to follow directions, and, it provides a baseline against which to assess the effects of treatment.

Treatment

Drugs

There have been four major treatments for enuresis that have been studied systematically. These treatment approaches are (1) pharmacological, (2) bladder expansion training, (3) urine alarm, and (4) dry-bed training. The most frequently used medication in the treatment of enuresis is a tricyclic antidepressant, imipramine hydrochloride (Tofranil). Tofranil has been found to be more effective than other medications that have been examined. The mechanism of action is not well understood, and effects are often attributed to (1) mood elevation, (2) lightening of level of sleep, (3) the anticholinergic effects of the medication resulting in detrusor muscle relaxation and, thus, greater bladder capacity, and (4) increased involuntary control over urethral sphincter (Blackwell & Currah,

1973; Labay & Boyarsky, 1972; Mahony, Laferte, & Mahoney, 1973). The data on the effects of imipramine have shown it to be more effective than placebo when given in doses ranging from 25 to 75 mg, adjusted for height and weight. Urinary control and decrease in frequency of enuresis during the 2 weeks of drug use have been found in as many as 85% of cases (Shaffer, 1977). Only about 30% achieve total continence, and 60–95% relapse following withdrawal of the medication (Blackwell & Currah, 1973; Kardash, Hillman, & Werry, 1968; Shaffer, 1977; Stewart, 1975). Cystometric studies have documented increased bladder capacity and delayed voluntary detrusor contractions in children being treated by imipramine (Hagglund & Parkkulainen, 1964). Dorison and Blackman (1962) treated 30 male army basic trainees for enuresis and found Tofranil and a lactose placebo to be equally effective.

Bladder Expansion Training

As a function of the speculation that many enuretic children have a smaller FBC than nonenuretics, with the results of frequent voiding, inability to inhibit voiding throughout a night, and inadequate strength of detrusor contractions to produce arousal during the night, attempts have been made to explore the effects of bladder expansion on nighttime enuresis. Starfield and Mellits (1968) found that increased bladder capacity was correlated with reduced nocturnal enuresis, but only 6 of 83 children treated in this fashion achieved continence. In some instances, large increases in functional bladder capacity were not associated with changes in bed-wetting, and, similarly, children who showed smaller or no changes did demonstrate decreases in enuresis. More recent studies (Kimmel & Kimmel, 1970; Paschalis, Kimmel, & Kimmel, 1972) have evaluated the effects of retention control training. Of 38 children exposed to these procedures, 17 reportedly became dry. Treatment duration ranged from 7 to 20 days. Other studies have not replicated this positive outcome (Allen, 1976; Harris & Purohit, 1977; Raeburn, Gemming, Lowe, & Dowrick, 1977). Retention training has been shown to be less effective than the urine alarm (Fielding, 1980) and dry-bed training (Doleys, Ciminero, Tollison, Williams, & Wells, 1977). A well-controlled and systematic study by Fielding (1980) does suggest that retention training can be a useful technique in treating children who exhibit daytime wetting with or without nighttime enuresis.

Urine Alarm

The urine alarm or bell-and-pad procedure makes use of a urine-sensing device that rests between the child and the mattress. Ideally, any amount of urine that is passed onto the sensing device triggers an alarm that is adjusted to an intensity sufficient to arouse the child. Awakening

is followed by the child toileting himself and then returning to bed for the night.

Through conditioning it is assumed that (a) the child will come to impose an inhibitory response on voiding, thus sleeping through the night or (b) bladder distension cues will acquire discriminative values sufficiently strong to arouse the child from sleep so that wetting does not occur in the bed. Initial studies using the urine alarm (Seiger, 1952) noted rates of remission of up to 80%. More recent reports (Lovibond, 1964; Lovibond & Coote, 1970; Turner, 1973; Yates, 1970) also describe rates of remission between 80 and 90%, with relapse rates approximating 35%. In a summary of studies conducted between 1960 and 1975, Doleys (1977) noted that data on over 600 subjects revealed a 75% rate of remission with treatment durations of 5–12 weeks and an average relapse rate of 41%. Of subjects who were exposed to retreatment after relapsing, 68% became continent. The urine alarm and parameters for its use have been and continue to be exposed to systematic experimentation. It has been found to be more effective than nighttime awakening (Catalina, 1976), placebo tablets (White, 1968), no treatment (DeLeon & Mandell, 1966), verbal psychotherapy (Novick, 1966), imipramine (McConaghy, 1969; Young, 1965a), and retention training (Allen, 1976). The use of stimulant medication as an adjunctive treatment to increase the likelihood that the child will be aroused by the alarm has been investigated (see Doleys, 1977) and could have some utility. Application of the urine alarm does carry with it several problems involving parental compliance and equipment reliability (Doleys *et al.*, 1981). The most frequently cited reason for treatment failures has been parental noncompliance. The urine alarm has also been applied to adult enuretics (Turner & Taylor, 1974) and deaf children (Baller & Giangreco, 1970). In the case of deaf children, a bright light was used in place of the buzzer.

Although at one point this procedure was criticized because some children experienced "buzzer ulcers" or personality and behavioral changes resulting from nighttime awakening by a strong stimulus, these problems either no longer exist because of modifications of equipment or, in the case of personality and behavioral changes, have been shown not to be the case (Sacks, DeLeon, & Blackman, 1974; Shaffer, 1973).

Two recent innovations to the standard urine alarm procedure have created some hope for an increase in the rate of remission and a decrease in the rate of relapse. One of these is the utilization of an intermittent alarm that can be programmed to operate on a given schedule (usually 50 to 70%) of the wets (Finley & Wansley, 1976; Finley, Besserman, Bennett, Clapp, & Finley, 1973; Finley, Wansley, & Blenkarn, 1977). The second innovation has been the utilization of gradually increasing liquid intake during the night in an attempt to produce a state of "overlearning." Preliminary studies (Jehu, Morgan, Turner, & Jones, 1977; Taylor & Turner, 1975; Young & Morgan, 1972) report beneficial effects when the overlearning procedure is added to the use of a standard urine alarm. This

procedure, however, is not without its difficulties (Young & Morgan, 1972) and requires further experimentation and application by an experienced clinician.

Dry-Bed Training

Azrin *et al.* (1973, 1974) introduced a multifaceted program emphasizing the application of social contingencies. This program, referred to as dry-bed training (DBT), incorporates positive practice, positive reinforcement, retention control training, nighttime awakening, negative reinforcement, and full cleanliness training. Initial studies were quite impressive. A replication by Doleys *et al.*, (1977) did show DBT to be significantly more effective than retention control training, but the rate of remission was not as high as in the Azrin studies. A 2-year follow-up showed that 5 of 8 children who achieved dryness through DBT continued to remain continent (Williams, Doleys, and Ciminero, 1978). Bollard and Woodroffe (1977) also replicated the DBT procedure and noted that each child who underwent training achieved 14 consecutive dry nights. Treatment duration was approximately 6 weeks and none of the children reportedly relapsed to pretreatment wetting frequencies during the 16-month follow-up, although two did require retreatment with the urine alarm.

Azrin and Besalel (1979) have developed a manual based on the DBT procedure to be used as a guide by parents of nonretarded nocturnally enuretic children. A recent investigation of this parent manual (Beselal, Azrin, Thienes-Hontos, & McMorrow, 1980) was undertaken by 13 parents without professional assistance. Enuresis was reduced from 68% of nights during baseline to 27% at the end of the first week, 10% at the end of 3 months and 7% at the end of 6 months. An average of six wettings was required before the child achieved the experimental criterion on the 14th consecutive dry night. One child failed to achieve this criterion within the 6 months. Continued exploration of this procedure is certainly warranted. It does seem highly successful for those parents who are able to carry out the specific requirements. Difficulties occur when the child is highly noncompliant or the parents are inconsistent in following up on the prescribed treatment.

Enuresis continues to be a major problem. Major threapeutic approaches have included the use of imipramine, retention control training, urine alarm, and dry-bed training. Imipramine, though initially effective, has not been documented to produce sustained continence in a large majority of the children with whom it is tried. Retention control training, though significant in producing increases in bladder capacity, does not appear to be the treatment of choice for reduction of nocturnal enuresis. Both dry-bed training and the urine alarm continue to be very effective and useful procedures when applied systematically and as intended. Further exploration is needed not only of these treatment techniques but to

help determine more adequate training procedures that might reduce the number of children who become nocturnally enuretic.

INCONTINENCE IN THE ELDERLY

Urinary incontinence in the elderly carries its own set of problems. Add the loss of bladder-functioning control to an already developing feeling of helplessness and despair and the insult is complete. Estimates of the prevalance of urinary incontinence in hospitalized elderly populations range up to 48% (Milne, 1976). Indeed, incontinence is one of the major factors in determining hospitalization. The percentage of patients who were incontinent on hospital admission was found to range up to 35% and 32% for men and women, respectively (Willington, 1969). Willington (1969) considers most of these as cases of *transitory incontinence* but did note that about 14% of patients who were incontinent at the time of hospitalization continued to be so. This group, which demonstrated persistent incontinence, was referred to as cases of *established incontinence.* Incontinent hospitalized patients present problems for the hospital and staff. More nursing time is required, staff–patient embarrassment must be attended to, special laundry facilities may be required, and there is an increase in work load for nursing and housekeeping staff (Adams & McLiwraith, 1963).

There are several factors associated with incontinence in the elderly. Deterioration of bladder control is likely, but spasticity, ataxia, physical disability, rigidity, akinesia, dysphasia, dementia, and discrimination also play a major role (Cook, 1976). Uropathic obstruction with overflow incontinence, cerebral vascular insufficiency and prostate infection in males may also be relevant factors. Decreased bladder capacity and increased trabeculation can result in urgency and frequency, not to mention chronic infection. Cytoscopy and cystometrograms may, therefore, be important diagnostic tools. Incontinence can also be iatrogenically contributed to by the use of diuretics and sedatives. Inflexible time schedules, unsympathetic staff, lack of privacy, refusal to use or restriction of lavatory privileges, and fear can all play a role in the development of incontinence (Willington, 1969). A major factor for many of the elderly is decreased mobility. Voiding schedules vary among the elderly. Imposition of unnecessary regimentation, scheduling or restrictions can increase incontinence. On the other hand, too great a willingness on the part of the staff to remove continence as a responsibility of the patient, which can be displayed by consistent reminders to the patient to void, can also increase incontinence by the patient becoming increasingly dependent on the staff.

Mundelstam (1977) has provided a number of potentially useful suggestions regarding management of urinary incontinence in the elderly: (1) providing a commode that is accessible either at the bedside or

the living room; (2) assuring that a bed pan or urinal is always available for the patient confined to a bed or wheelchair; (3) teaching the patient to completely empty the bladder by such maneuvers as bending forward; (4) encouraging a regular pattern of voiding whether the urge is felt or not; (5) maintaining a normal intake of liquids rather than trying to cut down; (6) avoiding constipation, preferably by attending to dietary intake; and (7) selecting clothing and nightwear so that the patient can more easily move about.

In a recent survey conducted in London (Corp & Turner, 1978) an attempt was made to assess staff attitudes and suggestions for treatment regarding incontinence in the elderly. Several interesting results were obtained. First, there tended to be a broad range of opinions among the staff regarding how big the problem of incontinence in the elderly was. In general, members of the staff who spent more time with problem patients tended to rate the problem as "severe." But opinions varied even among these staff members. Second, it appeared that regular toileting was used frequently and most effectively as a management technique. Third, patterns of incontinence did not seem to be systematically evaluated. Fourth, drugs and regular toileting were seen as the only viable treatment techniques. Indeed, approximately 20% of the staff saw no role for a treatment program for incontinence, believing that it was essentially untreatable. Fifth, there seemed to be a general consensus for the need for a larger nursing staff and more available toileting facilities. The authors summarized four recommendations: (1) an investigation into incontinence aids, clothing, furniture, and so forth, that might help in management of this problem in the elderly; (2) the development of a simple but accurate method for recording episodes of incontinence among patients so as to assist in evaluation of the problem and the effectiveness of any treatment that was applied; (3) the development of a library of materials and relevant literature regarding the problem of incontinence; and (4) periodic short in-service training sessions regarding management techniques.

Treatment

Given the magnitude of this problem, relatively little attention has been devoted to the efficacy of various behavioral treatment procedures for it. One book in the area (Willington, 1976) gives a very noteworthy presentation of many of the anatomical, physiological and social factors in incontinence in the elderly. The broad array of treatment approaches including the various clothing, appliances, and beddings that are available are reviewed. Perhaps the most frequently cited procedure is charting or record keeping. Brockelhurst (1976) talks about the importance of maintaining a 24-hour chart regarding the toileting activities of elderly patients. He has used the chart for two purposes. First, as a therapeutic aid it insures that the patient will empty the bladder approximately every 4

hours. Second, it can be used diagnostically to highlight patterns of incontinence that might then suggest a treatment program.

In some cases, behavioral procedures have been systematically applied to treatment of incontinence in the elderly. Atthowe (1972) treated a group of 12 severely disabled and chronic patients. The treatment program was incorporated into an already existing token economy program. Treatment consisted of 2 months of a noncontingent aversive phase. This phase consisted of placing the nighttime enuretics in a large, crowded 30-bed wing. Lights were turned on for 10 minutes four times during the night, and the patients were escorted to the bathroom whether or not they were wet. Patients were not allowed to smoke. Following this phase, there was a 6-month contingency management program. This program included verbal reinforcement for a dry bed, elimination of toileting in the middle of the night, and the opportunity to move to "better" sleeping quarters following one week of dryness. However, the patient would have to have enough tokens to purchase this better environment. Tokens were earned by a variety of behaviors including getting up and going to the bathroom unescorted and uninitiated at night. The results showed that the aversive treatment produced continence in all except those patients who were diagnosed as severe enuretics. The addition of the contingency management maintained this improvement and also produced continence in the remainder of the patients. Follow-ups at 2, 22, and 43 months showed that the effects were maintained. Grossicki (1968), however, used social reinforcement, token reinforcement, and response cost but did not obtain a significant decrease in incontinence.

Collins and Plaska (1975) assessed the effects of the urine alarm on geriatric patients in a nursing home. The average age of the patients was 81 years. Treatment involved 8 weeks of conditioning, and three groups were compared: untreated controls, a conditioning group, and a group with delayed onset of alarm. The results were somewhat discouraging, showing that only one subject in each group became continent (criterion, 10 consecutive dry nights) during treatment. At the end of treatment, however, the conditioning group showed the greatest reduction in wet nights. In attempting to account for these findings, the authors suggest that there might be "impaired conditionability" in this population. If so, treatment might have to be carried out for longer periods of time than would otherwise be expected. This would seem to be supported by Atthowe's data, which showed that it took up to 7 months of conditioning for some patients to demonstrate improvement. Another important factor, particularly in the use of reinforcement-oriented programs such as token economies, involves the "power" of the reinforcer.

This section was certainly not intended to summarize the entire body of literature dealing with urinary incontinence in the elderly. It is, however, intended to illustrate that studies involving a systematic evaluation of behavioral procedures in this area have been remarkably lacking. The data that do exist are inconsistent across studies. Little seems to

have been done in terms of more precisely assessing psychosocial factors that might contribute to the onset of incontinence.

URINARY TRACT INFECTIONS

Bacterial urinary tract infection is a common clinical problem (Kunin, 1970). It can be found in school-aged and adult females. Though not a behavioral disorder, its presence has been linked to certain "habits" and its prevention associated with a given behavioral regimen.

Adatto, Doebele, Galland, and Granowetter (1979) looked at the behavioral factors related to chronic urinary tract infections (UTI). They examined patients on the basis of sexual behavior, bowel and bladder habits, and liquid intake. The experimental group consisted of 84 females with a history of dysuria, urgency, and frequency. The subjects ranged in age from 18 to 35 with a median of 21 years; 84 controls 17–39 years (median, 23) were used. The data revealed that the UTI group tended to retain for much longer periods of time and more frequently following an initial urge to void. As children, 59% deferred micturition, as compared to 36% of the controls. Liquid intake was approximately equal between the two groups, though 67% of the UTI subjects deferred micturition regularly for 3 hours or more. There was no difference between the two groups in frequency of micturition. Of the UTIs, 24% had a history of stress incontinence, as compared to 4% of controls; sexual habits were similar.

The authors then tested a treatment regime that consisted of regular urination (approximately every 2 hours) postcoital voiding within 10 minutes, adequate hydration (230 plus ml per day), adequate lubrication during coitus, and careful wiping of the perineum, front to back, after each episode of urination. The effects of these procedures were examined in 72 patients who were followed for monthly urine cultures. Follow-up time varied from 12 to 26 months. Of the 72 patients, 65% reported no UTIs, and 19% reported a significant reduction. Physiologically, it was speculated that long-term delayed micturition can lead to ischemia of the bladder wall and also exposes the bladder to pathological organisms for a longer period of time.

Ervin, Kamaroff, and Pass (1980) conducted a similar study using slightly older populations composed of working women and housewives of diverse ethnic and socioeconomic backgrounds. In comparing the 23 UTI subjects with a control group ($n = 64$), the authors noted that the UTI group tended to drink less and void less frequently but found no statistically significant differences in terms of frequency of voluntary retention for 2 hours or more, frequency of voiding within 1 hour of coitus, sexual behavior, dyspareunia, perineal hygiene, use of tampons or vaginal sprays, frequency of douching, and wearing of panty hose, hose, or synthetic panties. The differences regarding chronic urinary retention

could not be accounted for. However, Ervin *et al.* did confirm the effectiveness of the behavioral regimen described by Adatto *et al.* (1979) in reducing the frequency of UTIs.

DYSFUNCTIONAL BLADDER SYNDROMES

Nonneurogenic Bladder Syndromes

Uncoordinated use of external urethral sphincter and detrusor action can result in abnormal voiding patterns characterized by urinary retention and/or diurnal dribbling. Recurrent urinary tract infection, hydronephrosis (collection of urine in the kidney), and bladder decompensation can result (Allen, 1977; DeLuca, Swenson, Fisher, & Loutfi, 1962; Maizels, King, & Firlit, 1979). This condition has been referred to as *detrusor–sphincter dyssynergia, lazy bladder syndrome,* and *nonneurogenic bladder.* Such dyssynergia (uncoordinated muscle movement) may or may not be related to neurological deficits.

Two studies (Maizels *et al.,* 1979; Wear, Wear, & Cleeland, 1979) have examined the use of biofeedback. Maizels *et al.* (1979) treated three girls (9–13 years) who had a history of diurnal incontinence, urinary infection, and hydronephrosis. Urological evaluations revealed sphincter dyssynergia. The children were selected on the basis that they (a) had been refractory to other treatments, (b) showed strong motivation for improvement, and (c) were able to understand biofeedback. The patients were hospitalized during treatment and hydrated to increase the frequency of voiding. Two surface electrodes were used. The objective of training was to retrain the subjects how to relax the extrenal urethral sphincter during voiding. This was accomplished by having the subjects observe EMG and urine flow recordings while voiding. One subject voided approximately every 45 minutes because of the increased liquid intake. Each time she did so, she observed the EMG and flow rates, receiving instruction on how to relax the pelvic floor musculature and urethral sphincter. Verbal reinforcement accompanied success. Within 24 hours, coordinated movement was noted. Voiding became increasingly spontaneous, and urgency and diurnal incontinence diminished. Outpatient biofeedback ensued. A relapse was noted at 2 months, however, with the subject recording she did not practice when not attached to the biofeedback equipment at home.

A second patient in this study also responded to biofeedback and demonstrated increased ability to suppress dyssynergia. The third patient was shown to have bilateral vesicoureteral reflux (backward flow of urine up the ureters). A ureteral implantation was performed, but the problem persisted, highlighted by urinary retention accomplished by the child via a squatting posture. Although the subject could recognize the sphincter

dyssynergia following 2 days of biofeedback, she was not able to control it.

Hinman and Baumann (1973) described a functional discoordination between detrusor contraction and sphincter relaxation. This syndrome is highlighted by failure to relax external sphincter during voiding and an often-noted paradoxical increase in sphincter tension.

Allen (1977) studied 21 cases and more specifically described the disorder as including diurnal and/or nocturnal wetting, cramping in the lower abdomen, lack of a sustained stream during voiding because of incomplete sphincter relaxation, diurnal frequency that was either high or low, associated bowel dysfunction (in 9 of 13 children), recurrent urinary infections, history of family disruption in the majority of cases, presence of residual urine, bilateral hydronephrosis, detrusor–sphincter dyssynergia as measured by either anal EMG recordings with the use of anal plug or needle electrodes, and hyposensitive detrusor contractability.

The management program outlined by Allen (1977) emphasized reeducation and retraining. It began at the time of the urodynamic evaluation. At this time, typical urodynamic procedures were repeated in the presence of the parents, and the child was encouraged to relax the perineum and maintain a steady stream without straining. Through monitoring of the events, the child was able to be directed and shown the success of his efforts. The presence of a sustained uninterrupted stream itself served as feedback for the child's performance. The parents were encouraged to continue practicing with the child at home. The patient was instructed to attempt to void every 3 hours or so while awake, going to the bathroom promptly whenever he experienced the desire to void and to set aside a sufficient amoung of time so as not to rush or feel that he must perform under pressure. The child was also encouraged to attempt to completely empty the bladder each time he voided. Continued parental encouragement, reinforcement, and maintenance of charts were also employed. Catheterization was used to remove any residual urine when the child returned for follow-up visits. Parental understanding and support were noted to be essential for success, and the use of psychological consultation for the family and child was frequently sought. Treatment frequently incorporated the use of imipramine hydrochloride to help in reducing wetness and fecal incontinence. Bethanechol chloride was also used to reduce residual urine. Stool softeners and enemas were applied as needed, and in some cases tranquilizers and skeletal muscle relaxers were used to overcome hyperactivity and anxiety. In no case, however, were such medications used in place of bladder retraining, which was maintained as the cornerstone of treatment. It was noted that follow-up was an essential part of the program and that 6 months of close observation was the minimum necessary to insure no relapses. In most cases, 1 year or more was required before habit patterns were well established. The author reports that each of the four children treated, and others who were

exposed to this procedure, showed a gradual but steady improvement clinically and radiographically.

Allen (1977) noted that dysfunctional voiding encompasses a broad range of disorders and is sometimes overshadowed by secondary vesicoureteral reflux, which is assumed to be the primary pathology rather than the bladder dysfunctioning. Under these circumstances, surgery may be carried out where it is perhaps not necessary. An IVP (intravenous pyelogram), cystoscopy, or cystometrogram may be needed for differential diagnosis.

DeLuca et al. (1962) describe dysfunctional lazy bladder syndrome wherein elevated threshold for the initiation of bladder contractions, as well as the easy and rapid adaptation of the bladder to inhibition of voiding, is observed. They note the disorder to be prevalent among children 2–6 years of age and twice as common in females as males. The majority of cases demonstrate a fever of unknown origin, abdominal pains, nausea, and vomiting. Some patients are referred for what appears to be abdominal mass but proves to be an enlarged bladder. Infrequent voiding, incontinence, and occasional urinary frequency are observed in these children. The problem is created when the individual does not respond to the urge to void and the contractions gradually disappear. The intravesical pressure decreases temporarily, rising again where involuntary contractions are less effective. Voiding, when it does occur, will be incomplete, and there may be a gradual elevation of intravesical pressure beyond the physiological limits of the bladder. It is hypothesized by DeLuca et al. that this abnormally high threshold might develop through habitual neglect on the patient's part to empty the bladder on having the urge to void. This can then lead to the bladder yielding to subsequent enlargement. This action tends to simulate what occurs with children with chronic constipation who have lost the urge to evacuate in response to normal stimuli.

Treatment begins with early management. It involves training the patient to void every 3 or 4 hours with the aim of reestablishing the urge to void at lower thresholds as an effective discriminative stimulus to return bladder to normal size. Patients need to be followed regularly to treat recurrent infections. They are also instructed to practice double or triple voiding to ensure complete emptying of the bladder.

Wear et al. (1979) used an intraurethral catheter with five surface electrodes spaced about 1 cm apart on the catheter to provide biofeedback training to eight adults (four males and four females). A carbon dioxide cystometer and sphincter electromyogram recorder with an attached auditory unit were used. Each subject had a documented history of urinary retention or incontinence. Some had evidence of neurogenic bladders. Subjects were first instructed in the involved urological anatomy and physiology. Treatment began by catheterizing the subjects and attaching the electrodes. The auditory unit was adjusted to provide analogue feedback regarding intravesical (bladder) pressure or EMG activity, depending

on the identified target response. A strip chart was also in view of the subject. Feedback sessions lasted 30–60 minutes. During this time, patients were encouraged and verbally reinforced for producing the desired response. Suggestions and images were used to help relax the urethral musculature. Sessions occurred once or twice per week for 5–10 weeks. Patients were also instructed to practice at home.

The criteria for success included (1) reduction in frequency and amount of incontinence, (2) reduction in residual urine, (3) improvement in the clinical problem as judged by the patient, and (4) reduction in the use of drugs and/or avoidance of surgery. Four of eight subjects were judged successful. Progress was generally evident within the first of three sessions. More than five sessions were rarely needed. The patients responded very positively to the time taken for instructions on anatomy and physiology. Some objected to the audio feedback, indicating that the sudden noise often startled them and resulted in unwanted muscle contractions. The authors suggested that several of the failures could have been avoided through improved patient selection. Care should be taken in selecting patients with short urethral lengths and histories of psychiatric problems and/or drug abuse.

A variety of factors were associated with effective and successful treatment:

> (1) a sympathetic, interested, non-critical attitude on the part of the teacher, (2) a receptive, willing, trusting student, (3) considerable patience by teacher and student, (4) the ability of the teacher to communicate verbally in such a way that the student can understand what is desired and what is going on and how the student can alter the end results, (5) a willingness of the student to do his homework, to practice at home between repeated learning sessions, (6) a quiet, pleasant learning environment without distractions or interruptions, (7) recording instrumentation that is adequate to measure, record and display the necessary physiological responses without constituting some kind of threat (for example: pain) to the student, (8) repeated training sessions with sufficient duration of frequency to accomplish the desired result, (9) a built-in system of reward to the student for his progress (for example: avoiding the need for drugs or an operation) and (10) a mutual expectation of success. (Wear et al., 1979, p. 467)

Some of the images used by the authors included suggestions of turning off a faucet, relaxing muscles in sequence from the scalp down through the body, imagining relaxing in a tub of warm water, and thinking of uretheral muscles as a hose that was being pinched so that water could not flow through.

Neurogenic Bladder Syndromes

Urinary dysfunctions can be directly related to some neurological deficit or trauma such as spinal cord lesion. Such cases are referred to as *neurogenic bladder dysfunction*. Because of the underlying pathology it is often assumed that retraining is not likely to be effective. Nergardh,

von Hedenberg, Helstrom and Ericsson (1974) and Schneider and Westendorf (1979), however have found retraining and biofeedback to be of use in such cases. Nergardh *et al.* (1974) exposed 30 children (5–15 years of age) to a retraining program. Of the 30 patients, 18 had myelomeningocele with deficits in the lumbar and sacral cord. The remaining 12 subjects had a variety of etiologies. Motivation of parent and child was a key factor in selection. Each patient showed a significant degree of incontinence. Treatment was carried out over an 8-week period in the hospital. The first week was devoted to assessment and rapport building. During the second week, liquid intake was increased and voiding was scheduled each 3–4 hours. "Straining" and manual pressure on the bladder was encouraged as the means of decreasing residual urine. This procedure continued for the third through the seventh week. A variety of medications were used when needed (e.g., carbacholine chloride) to stimulate bladder contractions, ephedrine to increase bladder capacity, diazepam to relax external sphincter. Increased liquids and drugs were discontinued during the eighth week. Two such 8-week training periods were carried out with 18 of the 30 subjects. The general results showed that 16 of the 30 subjects achieved "social continence" and 13 others were rated as much improved.

Schneider and Westendorf (1979) described the use of biofeedback with a 5-year-old girl who experienced spinal cord trauma and was diagnosed as having a flacid neurogenic type bladder. At the time of treatment, the patient had relearned to walk. She had accomplished about 40% control over bowel movements but had achieved no bladder control. The instrumentation used was arranged to provide feedback for increased bladder pressure. Once bladder pressure was increased, development of voluntary voiding was shaped. Training time was approximately 8 days. The results showed a decrease in residual urine and spontaneous voiding with an increase in voluntary voiding. An 18-month follow-up showed continuation of "normal" functioning.

Considerable work has been done in the area of sphincter electromyography (Blaivas, Labib, Bauer, & Retick, 1977; Bradley, Scott, & Timm, 1974). These data combined with the use of operant and biofeedback technology have resulted in new avenues of treatment for those patients suffering from neurogenic and functional urological disorders.

OTHER URINARY RETENTION DISORDERS

Two distinctly different types of urinary retention disorders have presented clinically. These two types of disorders are both referred to as psychogenic urinary retention. Because of the differences in clinical presentation, degree and type of associated psychopathology, and treatment approaches, these two disorders will be discussed separately and referred to as *psychogenic urinary retention* and *psychogenic anuria*. These dis-

orders meet the following criteria: (a) psychologically meaningful environmental stimuli are temporally related to initiation or exacerbation of a physical condition; (b) the physical condition has either demonstrable organic pathology or a known pathophysiological process; and (c) the condition is not due to a somatoform disorder.

Psychogenic Urinary Retention

This disorder presents clinically as a clear example of an anxiety-mediated disorder in which the individual is unable to urinate under specific environmental circumstances. It is commonly referred to as the "shy" or "bashful" bladder syndrome. The normal micturition response is the result of both reflexive and cortically mediated responses. As bladder volume increases to 200–400 ml, nerve endings in the bladder wall (stretch receptors) are stimulated. Impulses are transmitted by the visceral afferent nerve pathway to the spinal cord, resulting in the micturition reflex and a conscious desire to urinate. The micturition reflex occurs when efferent impulses are transmitted by parasympathetic nerve tracks to the bladder wall and to the internal urethral sphincter of the bladder. The bladder wall contracts as the internal sphincter relaxes. The remaining impediment to urination is voluntary relaxation of the external sphincter. Voluntary contraction of the abdominal wall, which exerts pressure against the bladder with temporary excitation of the stretch receptors, can elicit the micturition reflex in the absence of optimal levels of bladder volume, thus providing some capacity for urination prior to the normal elicitation of the micturition reflex. Under normal conditions, the micturition reflex subsides within a moment or so in the absence of urination. The desire for urination can thus be inhibited for several minutes to an hour or more before the micturition reflex is again elicited. Although recurrent inhibition of the micturition reflex is possible in the normal physiological process, increasing bladder volume elicits a stronger micturition reflex with more intense proprioceptive stimulation and an increased urgency for urination.

In the case of psychogenic urinary retention, there is a presumed conditioned inhibition of the micturition reflex associated with specific environmental stimuli. This disorder appears most often clinically as a specific type of social phobia (Lamontagne & Marks, 1973). The specificity of this problem is the primary defining characteristic that distinguishes it from psychogenic anuria, in which the problem is pervasive and urination cannot be elicited under even objectively comfortable situations.

In our experience and in those few cases discussed in the literature (Lamontagne & Marks, 1973; Shelton, 1978; Wilson, 1973), those suffering from the disorder develop an extremely restricted range of environmental situations in which urination is possible. In one particularly severe case, urination was possible only when the individual entered an

isolated janitor's closet of his office building where he could remove his clothes and turn on a slow dripping water faucet or when showering in the privacy of the bathroom of his home. Under no other conditions could a voluntary urination response be elicited.

The specificity of this disorder thus requires a great deal of care and precision in terms of behavioral assessment to elicit the specific environmental cues controlling the response. The restricted range of response also requires a treatment focus on generalization of the response once elicited in a controlled treatment setting to a more diverse and broader range of environmental situations.

In our experience with a limited number of cases ($n = 5$), the individuals experiencing this problem have not evidenced significant psychopathology. Those we have seen were rather compulsive and rigid individuals who could best be described in diagnostic terms as having obsessive-compulsive personality features. In each case, the individual was quite concerned about the social implications of the problem. Fears of social criticism, rejection, and disapproval were a common component of the clinical picture. In each case, powerful patterns of avoidance behavior had developed to control concern over the reactions others might have to the problem. At this point, it is impossible to state conclusively that the fears of social punishment were a primary etiological factor rather than being the result of the response deficit. This certainly seemed to be the case, as each also presented with other features consistent with elevated levels of social anxiety. In each case, the individual had experienced several urologic evaluations that had failed to document an organic basis for the problem.

Several different treatment approaches have been reported in the literature. In general these approaches attempt to facilitate a decreased level of arousal associated with urination. Wilson (1973) reported a case study involving "a 21 year old college student who could not urinate if anyone were in the bathroom or likely to enter" (p. 428). This individual was even more restricted as to conditions in which he could defecate. A trial of systematic desensitization proved ineffective in spite of the client's self-reported ability to relax deeply and to develop vivid imagery. Wilson suggested that the problem with desensitization was lack of generalization. A variation of a fading procedure developed by Davidson (1968) was chosen as the basic treatment approach. The client was instructed to attempt urination under "safe" conditions but to imagine someone entering at just the time when urination was inevitable. Apparently, progressively more anxiety-elevating stimuli were subsequently introduced at the point of "urinary inevitability." Although no follow-up data are provided, the individual presumably progressed well with this approach to the point of being able to "successfully urinate in a public lavatory no matter how crowded" (Wilson, 1973, p. 429). No corresponding changes were observed with the defecation problem, which emphasizes the speci-

ficity of this type of problem and provides some support for the efficacy of the specific technique as opposed to a more general placebo effect.

A second approach based on an anxiety reduction model has been reported by Lamontagne and Marks (1973). These authors discuss the successful treatment of two cases. Case 1 was a 51-year-old female with a 33-year duration of problems with urinary retention. Normal urination was possible only at her home. When away from home, she had, on occasions, failed to urinate for as much as 48 hours. She had a history of enuresis as a child until about age 5. Parental response to her urination was scolding. Her problem developed 1 year postsurgery for removal of an ovarian cyst in the absence of any specific trauma she could recall. Other than her problem with enuresis, she reported no childhood neurotic traits. She had no history of psychiatric disturbance, and her sexual adjustment was reportedly normal. Case 2 was a 31-year-old male with a 20-year duration of urinary retention problems. He could urinate only when alone or in "a fairly large public toilet which was fairly deserted." At home he could not urinate in the presence of his spouse. There was no history of enuresis or urinary pathology. The problem began when he entered high school, with no reported trauma. He reported no neurotic traits as a child, had no history of psychiatric disturbance, and was apparently experiencing no sexual problems. The individual did report severe headaches that occurred 3–4 times per week.

The treatment approach was similar for both cases. Case 1 received 13 treatment sessions, case 2, 8 sessions. The treatment approach involved intentionally increasing bladder volume followed by exposure to distressing stimuli while preventing escape or avoidance. Attempts were made to systematically confront the individual with progressively more difficult environmental situations. Homework assignments were made in a similar manner as improvement was noted in the treatment setting. No attempt was made to provoke anxiety even though the individuals both experienced "appreciable" anxiety in the early phases of treatment. At 9-month follow-up, both patients reported being able to successfully urinate in public lavatories without difficulty, although some problems persisted in situations that had not been a treatment focus.

A third study (Shelton, 1978) also examined the efficacy of an anxiety reduction model in treating psychogenic urinary retention. In an important elaboration of previous studies, Shelton (1978) examined the differential treatment effects of *in vivo* desensitization with a treatment approach that combined *in vivo* desensitization with systematic behavioral assignments. The addition of systematic behavioral assignments to *in vivo* desensitization resulted in a 50% quicker response to treatment and more generalization of treatment effects, even though no differences were noted in reduction of performance anxiety in public restrooms between the two groups. At 6-month follow-up, the results clearly favored the combined treatment group.

Our own experience in treating psychogenic urinary retention has thus far been an attempt to develop a standardized assessment and treatment approach that will be amenable to experimental investigation. Our approach to assessment has gradually become more comprehensive and now includes collection of a standardized evaluation battery including the Minnesota Multiphasic Personality Inventory (Hathaway & McKinley, 1967), the Fear Survey Schedule (Wolpe, 1969), the Rathus Assertion Scale (Rathus, 1973), and two scales measuring somewhat different aspects of social anxiety, the Fear of Negative Evaluation Scale and the Social Avoidance and Distress Scale (Watson & Friend, 1969). In addition to these more general measures, we are collecting relevant historical information (e.g., psychiatric histories, medical histories, data relative to onset, duration, and pervasiveness of the problem, etc.), as well as behavioral assessment data defining antecedent and consequent events, cognitive reactions, and type of avoidance responses. We are also carefully collecting data in specific controlled *in vivo* situations. For *in vivo* behavioral assessment, we have found the following measures to be of value: level of urge (1–7 Likert-type scale), subjective units of discomfort prior to and following attempts at urination, response latency, and length of response trial (from prompt to initiate urination until termination of the effort). It is our expectation that various combinations of these variables might prove to be of prognostic value in terms of response to treatment.

The treatment package we have been using includes the following elements: (a) intentional increase of bladder volume for treatment trials using planned ingestion of large quantities of iced tea, a natural diuretic; (b) practice in relaxing and contracting the external sphincter of the bladder, especially when voiding; (c) *in vivo* exposure to progressively more difficult situations in terms of social cues; (d) generalization trials in which the type and location of the lavatory is varied; and (e) specific homework assignments.

A typical treatment session involves exposure to a particular social situation (e.g., being alone in the lavatory with two people talking loudly outside the door) and the attempt at starting and then stopping the urinary flow at a high level of urgency (5 or greater). This provides practice in controlling the external sphincter, with trials repeated until the latency of response is successfully reduced to 10 seconds or less in five consecutive trials. At this point, generalization trials are conducted with the same social situation but in lavatories of different types and locations. Once a high level of urinary urgency has been achieved through ingestion of iced tea, repeated trials are possible with a relatively short intertrial interval. This is achieved because our protocol prohibits complete voiding of the bladder and, instead, involves merely starting urination and inhibiting the response as soon as a steady flow has been achieved. Each session is terminated on successful completion (latency ≤10 seconds) of the generalization scenes. A homework assignment is then made that

corresponds as closely as possible to the social focus of the session. The next session starts with a trial to criterion for the situation employed in the previous session and proceeds to behavioral rehearsal–flooding to a new social situation. Although we have yet to do so, we have considered varying the level of urgency in an attempt to further facilitate generalization. We have thus far had very good response within sessions to this treatment program with the three subjects who have been exposed to it. More difficulty has been experienced in promoting generalization to the natural environment, although in each case marked improvement has been observed with follow-up periods of at least 6 months.

These studies raise as many questions as they answer. Although at first glance it appears that techniques utilizing anxiety reduction methods show promise in the treatment of psychogenic urinary retention, the relative value of these different treatment approaches has not been evaluated, nor have nonspecific treatment effects been addressed. The relative utility of anxiety-reducing techniques have yet to be compared with techniques that focus on reinforced practice. Issues of how to best promote generalization of response from the treatment setting to the natural environment continue to be of clinical significance and require continued research focus.

Psychogenic Anuria

This disorder, in contrast to psychogenic urinary retention, presents as a much more alarming, psychologically and medically more complex disorder. These individuals present to urological clinics or medical practitioners with an inability to urinate for up to several days. Complete medical evaluation, including urological and neurological tests, is indicated. Anuria commonly presents as a major symptom of a number of medical disorders, including retroverted gravid uterus, hematocolpos, uterine fibroids, ovarian or broad-ligament tumors, bladder neck obstructions, ingestion of various medications, or various types of neurological disorders like multiple sclerosis. Consequently, diagnosis of psychogenic anuria must follow a careful and thorough medical evaluation. Margolis (1965) suggested that, in addition to excluding an organic cause of symptomatic anuria, the diagnosis of psychogenic anuria cannot be made in the absence of accurate information closely linking psychological or social trauma to urinary retention or documentation of other features of psychopathology. Associated types of psychopathology assume myriad forms with the disorder being observed in a varied group of individuals with diagnoses of both a neurotic or psychotic nature.

The literature on psychogenic anuria is best characterized as case oriented with a heavy psychodynamic flavor. Numerous case reports dating to the early twentieth century (Eyres, 1912) have attempted to formulate a relationship between psychosocial stress, patterns of psychodynamic adjustment, and the presentation of psychogenic anuria.

Such varied psychodynamic formulations as fear of death, fear of combat during war, fear of sexual attack, and conflict over sexuality wherein catheterization was symbolic of sublimated masturbation have been formulated to account for the clinical presentations (Wahl & Golden, 1963). The psychoanalytic assumption that urinary functions are symbolically associated with sexuality is reflected in Menninger's (1941) assertion that disorders of urinary retention and frequency are an expression of a self-punitive tendency in a patient, ordinarily an indication of an attempt to atone for guilt over sexual thoughts or activities. In a review of six cases of psychogenic anuria, Wahl and Golden (1963) discuss the following conclusions, which generally summarize the more psychoanalytically based literature: (a) a surprisingly high frequency of repressed sexual conflicts in individuals with psychogenic anuria; (b) evidence that this "psychosomatic pattern" is unconsciously learned in childhood and subsequently reinforced; (c) a high frequency of prior symptomatic urinary difficulty; (d) a relationship between repressed hostility and resentment in a significant number of such patients; (e) a general tendency among these patients to repress or "bottle up" their emotions; (f) a high incidence of secondary gain; and (g) that the symptom of psychogenic anuria results from the interaction of varies emotional conflicts with an equally varied range of personality styles.

Although studies of psychogenic anuria have often been characterized by lengthy descriptions and careful observations, this might reflect the theoretical stance of the investigator more than an actual empirical relationship between etiological factors and the manifestation of the disorder. Larson, Swenson, Utz, and Steinhilber (1963) have reported a more objective review of descriptive characteristics of 37 cases of psychogenic anuria seen at the Mayo Clinic. The results of their investigation suggested the following: (a) most cases had multiple physical complaints with a notably high number of cases that had undergone previous surgeries for primarily gynecological or gastrointestinal symptoms (1–2 operations, 8 patients; 3–5 operations, 20 patients; 6 or more operations, 7 patients); (b) only 35% of cases mentioned symptoms (e.g., nervousness) that could be interpreted as psychological in nature, but patients commonly mentioned such physical symptoms as chronic low back pain, headache, and various gastrointestinal problems; (c) in 25 patients seen for psychiatric examination, all were thought to have sufficient psychopathology for psychiatric diagnosis (neurotic, 17 patients, with 12 diagnosed as conversion hysteria and 3 as neurotic depression; psychotic, 8 patients, with 5 diagnosed as schizophrenia and 3 as psychotic depression); (d) most patients were of average intelligence and were described as sweet, charming, seductive, and not appropriately concerned about their illness, thus manifesting marked hysteroid personality characteristics; (e) most patients related some trauma, either physical (gynecologic surgery, medical illness, childbirth) or psychic (marital discord, broken love affairs), to the onset of symptoms; (f) all patients were resistant to exploring

or discussing emotional factors that could be implicated in their presenting symptoms.

These data suggest that a large percentage of patients seem to have identifiable psychological problems; however, the problems are of a diverse nature, emphasizing the need for an idiographic approach to assessment. The surprisingly high percentage of psychotic patients (32%) reported by Larson *et al.* (1963) suggests the need for routine psychological screening and triage of psychotic individuals to appropriate treatment resources. With nonpsychotic individuals, careful behavioral analysis should focus on identifying the antecedents of the disturbance with focus on both physical and psychic sources of stress and with a careful examination of assertive skills, sexual difficulties (particularly fear and guilt about sexual thoughts, feelings, and behavior), and possible avoidance functions associated with the psychogenic anuria.

Several lines of evidence suggest a pathophysiological response with psychogenic anuria. Straub, Ripley, and Wolf (1949) measured changes in bladder pressure, assessing psychogenic anuria and excessive urinary frequency with a cystometric recorder. Their results suggest a correlation between changes in bladder function and changes in emotional state. With excessive urinary frequency, they observed a greater bladder pressure that was associated with discussion of distressing life events as contrasted with periods of relaxation. In cases of excessive urinary frequency, subjects were more likely to be overtly anxious and/or resentful and to be aware of sources of conflict. In contrast, cases of psychogenic anuria evidenced less bladder pressure during periods of discussion of stressful topics. Those with psychogenic anuria were more likely to evidence a pattern of emotional repression with less awareness of sources of conflict and were more likely to react through withdrawal.

A technically more sophisticated and more elaborate urodynamic investigation of acute urinary retention has been reported by Blaivas and Labib (1977). Their results suggest that psychogenic anuria might be the result of an interaction of different patterns of EMG response of the external urethral sphincter and changes in intravesical pressure of the bladder.

Only two treatment approaches based on a behavioral model have been reported. Cooper (1965) treated a 60-year-old female with a 10-year history of recurrent psychogenic anuria. The subject had several previous hospitalizations associated with symptoms of depression and anuria. The presentation of these symptoms "were largely reactive and were causally related to the patient's relationship with her husband," who was described "as an intolerant man, unsympathetic, bullying and often violent towards her" (p. 575). It is noteworthy that on several occasions while hospitalized, anuria occurred immediately prior to a planned weekend leave when she was to spend time with her spouse. The symptom of anuria was considered "partially adaptive, as it served the protective function of keeping the patient away from her husband" (p. 575).

Treatment consisted of using a classical conditioning technique in which bladder tension was paired with a subcutaneous injection of carbachol to elicit an involuntary voiding of the bladder. Repeated pairings of the CS (bladder tension) with the UCS (injection of carbachol) reportedly resulted in higher order conditioning in which, later, the injection of sterile water, the sight of a syringe, and ultimately bladder tension alone elicited urination. Cooper noted the limitations of such treatment due to the powerful avoidance properties associated with psychogenic anuria, in this case removal of the patient from a stressful family situation.

Although this case provides some understanding of a behavioral view of psychogenic anuria, it fails to address the problem in a comprehensive manner. By not specifically addressing the avoidance functions of the behavioral disorder, treatment efficiency would most likely be compromised. This case therefore highlights the need for a careful behavioral analysis with a broad-spectrum treatment approach.

In contrast, Campbell and Latimer (1980) employed a more board-based behavioral treatment approach in treating a 22-year-old female. The patient was hospitalized in a psychiatric facility following a 2-year history of recurrent psychogenic anuria. In association with the presenting complaints of psychogenic anuria, the individual evidenced the following problems: depression, fear of being alone, fear of sex, sexual ignorance, seizure disorder, and a variety of somatic complaints (e.g., numbness, pains in the leg, etc.). The episode of anuria that precipitated hospitalization was directly related to psychological trauma. Anuria occurred shortly following her first attempt at sexual intercourse with her boyfriend. This experience was not "a success for either party and was quite anxiety-producing for the patient" (Campbell & Latimer, 1980, p. 28). After a failure to treat the individual with an indwelling urinary catheter and bag for 6 months (seven attempts to remove the catheter failed), she was admitted for evaluation and treatment.

Behavioral analysis suggested that her symptom of anuria was positively reinforced by social and medical interventions as well as by anxiety reduction via avoidance of sexual contacts. A broad-based treatment approach employing a bladder-training method using biofeedback was combined with sexual education, relaxation training, and in vivo desensitization to overcome her sexual fears and fears of being alone. In addition, interpersonal skills training was also employed as a part of the treatment package. The combined treatment approach, which lasted approximately 6 months, resulted in an extremely positive outcome after a follow-up period of 9 months.

The biofeedback procedure provided visual feedback concerning bladder tension and urinary flow. The authors correctly noted that it was impossible to draw firm conclusions about the efficiency of each component of treatment, but they did feel that the feedback procedure was an important treatment component. They also noted "that it is unlikely that

a treatment using feedback alone would have a lasting effect" (Campbell & Latimer, 1980, p. 30).

The current knowledge concerning treatment of psychogenic anuria is obviously limited. In the early stages of clinical research with this disorder, it appears necessary first to carefully collect behavioral assessment data. The goal of careful assessment is a comprehensive but idiographically based treatment approach that looks beyond treatment of the specific behavior of psychogenic anuria to the associated problems characteristic of those heterogeneous individuals manifesting this behavioral disorder. This type of clinical problem illustrates well the need for experimental study of the single case, with a primary goal not of generalizing specific treatment approaches to other similar cases but of developing and refining a conceptual approach and an experimental methodology that can be of value to diverse problems confronting medical psychology.

SUMMARY

This chapter was designed to provide a brief overview of a variety of urological disorders for which the behaviorally trained psychologist might provide meaningful input. The review was not intended to be exhaustive. It should, hopefully, provide an impetus for further work in the area of behavioral urology. In particular, there is a significant need for the refinement of assessment procedures related to the various urological dysfunctions. Second, detailed single-subject experimentation methodology could be fruitfully applied as a means of developing and refining treatment techniques. Group comparison studies would then be required to determine the overall efficacy of the various procedures. Generality of treatment effects continues to be a major problem for those procedures that have already been demonstrated to be of utility. Finally, there is a great need for the development of preventive measures such as the regimen described for reducing chronic urinary tract infections.

REFERENCES

Adams, G. F., & McLiwraith, P. M. *Geriatric nursing.* London: Oxford University Press, 1963.

Adatto, K., Doebele, K. G., Galland, L., & Granowetter, L. Behavioral factors and urinary tract infection. *Journal of the American Medical Association*, 1979, *241*, 2525–2526.

Allen, R. B. *Bladder capacity and awakening behavior in the treatment of enuresis*. Unpublished doctoral dissertation, University of Vermont, 1976.

Allen, T. D. The non-neurogenic neurogenic bladder. *Journal of Urology*, 1977, *117*, 232–238.

Atthowe, J. M. Controlling nocturnal enuresis in severely disabled and chronic patients. *Behavior Therapy*, 1972, *3*, 232–239.

Atthowe, J. M. Nocturnal enuresis and behavior therapy: A functional analysis. In R. B. Rubin, J. Henderson, H. Fensterheim, & L. P. Ullmann (Eds.), *Advances in behavior therapy* (Vol. 4). New York: Academic Press, 1973.

Azrin, N. H., & Besalel, V. A. *Parent's guide to bedwetting control: A step-by-step method*. New York: Simon & Schuster, 1979.

Azrin, N. H., Sneed, T. J., & Foxx, R. M. Dry-bed: A rapid method of eliminating bedwetting (enuresis) of the retarded. *Behaviour Research and Therapy*, 1973, *11*, 427–434.

Azrin, N. H., Sneed, T. J., & Foxx, R. M. Dry-bed training: Rapid elimination of childhood enuresis. *Behaviour Research and Therapy*, 1974, *12*, 147–156.

Baker, B. L. Symptom treatment and symptom substitution in enuresis. *Journal of Abnormal Psychology*, 1969, *74*(1), 42–49.

Bakwin, H. The genetics of enuresis. *Clinics in developmental medicine*, 1973, 48/49, 73–77.

Baller, W. R., & Giangreco, C. J. Correction of nocturnal enuresis in deaf children. *The Volta Review*, December 1970, 545–549.

Besalal, V. A., Azrin, N. H., Thienes-Hontos, P., & McMorrow, M. Evaluation of a parent's manual for training enuretic children. *Behaviour Research and Therapy*, 1980, *18*, 358–360.

Blackwell, B., & Currah, J. The pharmacology of nocturnal enuresis. In I. Kolvin, R. C. MacKeith, & S. R. Meadow (Eds.), *Bladder control and enuresis*. Philadelphia: W. B. Saunders, 1973.

Blaivas, J. G., & Labib, K. B. Acute urinary retention in women. *Urology*, 1977, *10*, 383–389.

Blaivas, J. G., Labib, K. L., Bauer, S. B., & Retick, A. B. A new approach to electromyography of the external urethral sphincter. *Journal of Urology*, 1977, *117*, 773–777.

Bollard, R. J., & Woodroffe, P. The effect of parent-administered dry-bed training on nocturnal enuresis in children. *Behaviour Research and Therapy*, 1977, *15*(2), 159–165.

Bostack, J. Exterior gestation, primitive sleep, enuresis and asthma: A study in etiology. *Medical Journal of Australia*, 1958, *149*, 185–192.

Boyd, M. M. The depth of sleep in enuretic school children and in non-enuretic controls *Journal of Psychosomatic Research*, 1960, *4*, 274–281.

Bradley, W. E., Scott, F. B., & Timm, G. W. Sphincter electromyography. *Urologic Clinics of North America*, 1974, *1*, 69–80.

Braithwaithe, J. V. Some problems associated with enuresis. *Proceedings of the Royal Society of Medicine*, 1956, *49*, 33–39.

Brockelhurst, J. C. Management of the uninhibited neurogenic bladder. In F. L. Willington (Ed.), *Incontinence in the elderly*. New York: Academic Press, 1976.

Campbell, D., & Latimer, P. Biofeedback in the treatment of urinary retention. *Behavior Therapy and Experimental Psychiatry*, 1980, *11*, 27–30.

Catalina, D. A. Enuresis: The effects of parent contingent wake-up. *Dissertation Abstracts*, 1976, *37*, 28–025.

Ciminero, A. R., & Doleys, D. M. Childhood enuresis: Considerations in assessment. *Journal of Pediatric Psychology*, 1976, *4*, 17–20.

Cohen, M. W. Enuresis. *The Pediatric Clinics of North America*, 1975, *22*(3), 545–560.

Collins, R. W., & Plaska, R. Mowrer's conditioning treatment for enuresis applied to geriatric subjects in a nursing home. *Behavior Therapy*, 1975, *6*, 632–638.

Cook, J. B. The neurological significance of incontinence in the elderly. In F. L. Willington (Ed.), *Incontinence in the elderly*. New York: Academic Press, 1976.

Cooper, A. J. Conditioning therapy in hysterical retention of urine. *British Journal of Psychiatry*, 1965, *111*, 575–577.

Corp, M., & Turner, K. *A survey of nurse attitudes to incontinence: A summary of findings*. Unpublished manuscript, Towers Hospital, London, England, 1978.

Davidson, G. C. Elimination of a sadistic fantasy by client-controlled counter conditioning technique. *Journal of Abnormal Psychology*, 1968, *73*, 84–90.

deJonge, G. A. Epidemiology of enuresis: A survey of the literature. In I. Kolvin, R. C. MacKeith, & S. R. Meadows (Eds.), *Bladder control and enuresis*. Philadelphia: J. B. Lippincott, 1973.

De Leon, G., & Mandell, W. A comparison of conditioning and psychotherapy in the treatment of functional enuresis. *Journal of Clinical Psychology*, 1966, *22*, 326–330.

DeLuca, F. A., Swenson, O., Fisher, J. H., & Loutfi, A. H. The dysfunctional "lazy" bladder syndrome in children. *Archives of Disease in Childhood*, 1962, *37*, 117–121.

Dische, S. Management of enuresis. *British Medical Journal*, 1971, *2*, 33–36.

Doleys, D. M. Behavioral treatments for nocturnal enuresis in children: A review of the recent literature. *Psychological Bulletin*, 1977, *84*(1), 30–54.

Doleys, D. M. Assessment and treatment of enuresis and encopresis in children. In M. Hersen, R. Eisler, & P. Miller (Eds.), *Progress in behavior modification*. New York: Academic Press, 1978.

Doleys, D. M. Assessment and treatment of childhood enuresis. In A. J. Finch & P. C. Kendall (Eds.), *Treatment and research in child psychopathology*. New York: Spectrum, 1979.

Doleys, D. M. Enuresis. In J. Ferguson & C. B. Taylor (Eds.), *Advances in behavioral medicine*. New York: Spectrum. 1980.

Doleys, D. M. Enuresis and encopresis. In T. H. Ollendick & M. Hersen (Eds.) *Handbook of child psychopathology*. New York: Plenum, (in press).

Doleys, D. M., Ciminero, A. R., Tollison, J. W., Williams, C. L., & Wells, K. C. Dry-bed training and retention control training: A comparison. *Behavior Therapy*, 1977, *8*, 541–548.

Doleys, D. M., Schwartz, M., & Ciminero, A. R. Elimination problems. In E. J. Marsh & L. G. Terdal (Eds.), *Behavioral assessment of childhood disorders*. New York: Guilford Press, 1981.

Dorison, E. E., & Blackman, S. Imipramine in the treatment of adult enuretics. *American Journal of Psychiatry*, 1962, *119*(5), 474.

Ervin, C., Kamaroff, A. L., & Pass, T. M. Behavioral factors and urinary tract infection. *Journal of the American Medical Association*, 1980, *243*, 330–331.

Esperanca, M., & Gerrard, J. W. Nocturnal enuresis: Comparison of the effect of imipramine and dietary restriction on bladder capacity. *Canadian Medical Association Journal*, 1969, *101*, 721–724.

Eyres, H. M. Nervous retention of urine. *British Medical Journal*, 1912, *1*, 484.

Faray, L. G. Enuresis: A genetic study. *American Journal of Diseases of Childhood*, 1935, *49*, 557–578.

Fielding, D. The response of day and night wetting children and children who wet only at night to retention control training and the enuresis alarm. *Behaviour Research and Therapy*, 1980, *18*, 305–317.

Finley, W. W. An EEG study of the sleep of enuretics at three age levels. *Clinical Electroencephalography*, 1971, *2*(1) 46–50.

Finley, W. W., & Wansley, R. A. Use of intermittent reinforcement in a clinical-research program for the treatment of enuresis nocturna. *Journal of Pediatric Psychology*, 1976, *4*, 24–27.

Finley, W. W., Besserman, R. L., Bennett, L. F., Clapp, R. K., & Finley, P. M. The effect of continuous, intermittent, and "placebo" reinforcement on the effectiveness of the conditioning treatment for enuresis nocturna. *Behaviour Research and Therapy*, 1973, *11*, 289–297.

Finley, W. W., Wansley, R. A., & Blenkarn, M. M. Conditioning treatment of enuresis using

a 70% intermittent reinforcement schedule. *Behaviour Research and Therapy,* 1977, *15*(5), 419–427.

Grossicks, J. P. Effect of operant conditioning on modification of incontinence in neuro-psychiatric geriatric patients. *Nursing Research,* 1968, *17,* 304–312.

Hagglund, T. B., & Parkkulainen, K. Enuretic children treated with imipramine. *Annales Paediatriae Fenniae,* 1964, *11,* 53–59.

Harris, L. S., & Purohit, A. P. Bladder training and enuresis: A controlled trial. *Behaviour Research and Therapy,* 1977, *15,* 485–490.

Hathaway, S. R., & McKinley, J. C. *The Minnesota Multiphasic Personality Inventory manual, revised.* New York: The Psychological Corporation, 1967.

Hinman, F., & Baumann, F. Vesical and ureteral damage from voiding dysfunction in boys without neurologic or obstructive disease. *Journal of Urology,* 1973, *109,* 727–732.

Jehu, D., Morgan, R. T. T., Turner, R. K., & Jones, A. A controlled trial of the treatment of nocturnal enuresis in residential homes for children. *Behaviour Research and Therapy,* 1977, *15,* 1–16.

Kaffman, M., & Elizur, E. Infants who become enuretic: A longitudinal study of 161 Kibbutz children. *Child Development Monographs,* 1977, No. 42.

Kardash, S., Hillman, E., & Werry, J. Efficacy of imipramine in childhood enuresis: A double-blind control study with placebo. *Canadian Medical Association Journal,* 1968, *99,* 263–266.

Kimmel, H. D., & Kimmel, E. C. An instrumental conditioning method for the treatment of enuresis. *Journal of Behavior Therapy and Experimental Psychiatry,* 1970, *1,* 121–123.

Kunin, C. M. The natural history of recurrent bacteriuria in school girls. *New England Journal of Medicine,* 1970, *282,* 1443–1448.

Labay, P., & Boyarsky, S. The pharmacology of imipramine and its mechanism of action on enuresis. *Archives of Physical Medicine and Rehabilitation,* 1972, *53,* 584.

Lamontagne, Y., & Marks, I. M. Psychogenic urinary retention: Treatment by prolonged exposure. *Behavior Therapy,* 1973, *4,* 581–585.

Larson, J. W., Swenson, W. M., Utz, D. C., & Steinhilber, R. M. Psychogenic urinary retention in women. *Journal of the American Medical Association,* 1963, *184,* 697–700.

Lovibond, S. H. *Conditioning and enuresis.* Oxford, England: Pergamon Press, 1964.

Lovibond, S. H., & Coote, M. A. Enuresis. In C. G. Costello (Ed.), *Symptoms of Psychopathology.* New York: Wiley, 1970.

Mahony, D. T., Laferte, R. O., & Mahoney, J. E. Observations on sphincter-augmenting effect of imipramine in children with urinary incontinence. *Urology,* 1973, *1*(4), 317–323.

Maizels, M., King, L. R., & Firlit, C. F. Urodynamic biofeedback: A new approach to treat vesical sphincter dyssynergia. *Journal of Urology,* 1979, *122,* 205–209.

Mandelstam, D. *Incontinence: A guide to the understanding and management of a very common complaint.* London: Heinemann Medical Books, 1977.

Margolis, G. J. A review of literature of psychogenic urinary retention. *Journal of Urology,* 1965, *94,* 257–258.

McConaghy, N. A controlled trial of imipramine, amphetamine, pad-and-bell conditioning and random wakening in the treatment of nocturnal enuresis. *Medical Journal of Australia,* 1969, *2,* 237–239.

Menninger, K. A. Some observation on the psychological factors in urination and genitourinary afflictions. *Psychoanalytic Review,* 1941, *28,* 117–129.

Mikkelsen, E. J., Rapoport, J. L., Nee, L., Gruenau, C., Mendelson, W., & Gillin, C. Childhood enuresis: I. Sleep patterns and psychopathology. *Archives of General Psychiatry,* 1980, *37,* 1139–1144.

Milne, J. S. Prevalence of incontinence in the elderly age groups. In F. L. Willington (Ed.), *Incontinence in the elderly.* New York: Academic Press, 1976.

Mowrer, O. H., & Mowrer, W. M. Enuresis—a method for its study and treatment. *American Journal of Orthopsychiatry,* 1938, *8,* 436–459.

Muellner, S. R. The physiology of micturition. *Journal of Urology,* 1951, *65*(5), 805–813.

Muellner, S. R. Development of urinary control in children: A new concept in cause, prevention and treatment of primary enuresis. *Journal of Urology*, 1960, *84*, 714–716. (a)

Muellner, S. R. Development of urinary control in children. *Journal of the American Medical Association*, 1960, *172*(12), 1256–1261. (b)

Nergardh, A., von Hedenberg, C., Hellström, B., & Ericssen, N. Continence training of children with neurogenic bladder dysfunction. *Developmental Medicine and Child Neurology*, 1974, *16*, 47–52.

Novick, J. Symptomatic treatment of acquired and persistent enuresis. *Journal of Abnormal Psychology*, 1966, *71*(5), 363–368.

Oppel, W. C., Harper, P. A., & Rider, R. V. The age of attaining bladder control. *Pediatrics*, 1968, *42*(4), 614–626.

Paschalis, A. P., Kimmel, H. D., & Kimmel, E. Further study of diurnal instrumental conditioning in the treatment of enuresis nocturna. *Journal of Behaviour Therapy and Experimental Psychiatry*, 1972, *3*, 253–256.

Perlmutter, A. D. Enuresis. In R. Kelalis (Ed.), *Clinical pediatric urology*. Philadelphia: W. B. Saunders, 1976.

Pierce, C. M. Enuresis. In A. M. Freedman & H. I. Kaplan (Eds.), *The child: His psychological and cultural development* (Vol. 1). New York: Atheneum, 1972.

Raeburn, J. M., Gemming, J. S., Lowe, B., & Dowrick, P. W. *The Kimmel and Kimmel technique for treating nocturnal enuresis: Two controlled studies*. Unpublished manuscript, University of Auckland Medical School, Auckland, New Zealand, 1977.

Rathus, S. A. A 30-item schedule for assessing assertive behavior. *Behavior Therapy*, 1973, *4*, 398–406.

Ritvo, E. R., Ornitz, E. M., Gottlieb, F., Poussaint, A. F., Maron, B. J., Ditman, K. S., & Blinn, K. A. Arousal and nonarousal enuretic events. *American Journal of Psychiatry*, 1969, *126*(1), 115–122.

Rutter, M. Indication for research. In I. Kolvin, R. C. MacKeith, & S. R. Meadow (Eds.), *Bladder control and enuresis*. Philadelphia: J. B. Lippincott, 1973.

Sacks, S., DeLeon, G., & Blackman, S. Psychological changes associated with conditioning functional enuresis. *Journal of Clinical Psychology*, 1974, *30*, 271–276.

Schneider, R. D., & Westendorf, K. Adjuvant bladder-pressure biofeedback in treating neurogenic bladder dysfunction: A case report. *Behaviour Therapist*, 1979, *2*, 29–31.

Seiger, H. W. Treatment of essential nocturnal enuresis. *Journal of Pediatrics*, 1952, *49*(6), 738–749.

Shaffer, D. The association between enuresis and emotional disorder: A review of the literature. In I. Kolvin, R. C. MacKeith, & S. R. Meadow (Eds.), *Bladder control and enuresis*. Philadelphia: W. B. Saunders, 1973.

Shaffer, D. Enuresis. In M. Rutter & L. Hersov (Eds.), *Child psychiatry, modern approaches*. Philadelphia: Blackwell Scientific Publications, 1977.

Shelton, J. L. *Using systematic behavioral assignments for the treatment of conditioned urinary retention*. Paper presented at the Association for Advancement of Behavior Therapy convention, San Francisco, November 1978.

Sperling, M. Dynamic considerations and treatment of enuresis. *Journal of the American Academy of Child Psychiatry*, 1965, *4*, 19–31.

Starfield, B. Functional bladder capacity in enuretic and nonenuretic children. *Journal of Pediatrics*, 1967, *70*(5), 777–781.

Starfield, B., & Mellits, E. D. Increase in functional bladder capacity and improvements in enuresis. *Journal of Pediatrics*, 1968, *72*(4), 483–487.

Stewart, M. A. Treatment of bedwetting. *Journal of the American Medical Association*, 1975, *232*, 281–283.

Straub, L. R., Ripley, H. S., & Wolf, S. Disturbances of bladder function associated with emotional states. *Journal of the American Medical Association*, 1949, *141*, 1139–1143.

Taylor, P. D., & Turner, R. K. A clinical trial of continuous, intermittent and overlearning "bell and pad" treatments for nocturnal enuresis. *Behaviour Research and Therapy*, 1975, *13*, 281–293.

Turner, R. K. Conditioning treatment of nocturnal enuresis: Present status. In I. Kolvin, R. C. MacKeith, & S. R. Meadow (Eds.), *Bladder control and enuresis.* Philadelphia: J. B. Lippincott, 1973.

Turner, R. K., & Taylor, P. D. Conditioning treatment of nocturnal enuresis in adults: P eli inary findings: *Behaviour Research and Therapy,* 1974, *12,* 41–52.

Wahl, C. W., & Golden, J. S. Psychogenic urinary retention. *Psychosomatic Medicine,* 1963, *25,* 543–555.

Walker, C. E. Toilet training, enuresis, encopresis. In P. R. Magrab (Ed.), *Psychological management of pediatric problems* (Vol. 1). Baltimore: University Park Press, 1978.

Watson, D., & Friend, R. Measurement of social-evaluative anxiety. *Journal of Consulting and Clinical Psychology,* 1969, *33,* 448–457.

Wear, J. B., Wear, R. B., & Cleeland, C. Biofeedback in urology using urodynamics: Preliminary observations. *Journal of Urology,* 1979, *119,* 464–468.

Werry, J. S. Enuresis—a psychosomatic entity? *Canadian Medical Association Journal,* 1967, *97,* 319–327.

Werry, J. S., & Cohrssen, L. Enruesis: An etiologic and therapeutic study. *Journal of Pediatrics,* 1965, *67,* 423–431.

White, M. A thousand consecutive cases of enuresis: Results of treatment. *Medical Officer,* 1968, *120,* 151–155.

Williams, C. L., Doleys, D. M., & Ciminero, A. R. A two-year follow-up of enuretic children treated with dry bed training. *Journal of Behavior Therapy and Experimental Psychiatry,* 1978, *9,* 285–286.

Willington, F. L. Problems of urinary incontinence in the aged. *Gerontology Clinics,* 1969, *11,* 330–356.

Willington, F. L. (Ed.), *Incontinence in the elderly.* New York: Academic Press, 1976.

Wilson, G. T. Innovations in the modification of phobic behaviors. *Behavior Therapy,* 1973, *4,* 426–430.

Wolpe, J. *The practice of behavior therapy.* New York: Pergamon Press, 1969.

Yates, A. J. Enuresis and encopresis. In A. J. Yates, *Applications of behavior therapy.* New York: John Wiley, 1970.

Yeates, W. K. Bladder function in normal micturition. In I. Kolvin, R. C. MacKeith, & S. R. Meadow (Eds.), *Bladder control and enuresis.* Philadelphia: J. B. Lippincott, 1973.

Young, G. C. Conditioning treatment of enuresis. *Developmental Medicine and Child Neurology,* 1965, *7,* 557–562. (a)

Young, G. C. The aetiology of enuresis in terms of learning theory. *Medical Officer,* January 1965, *113,* 19–23. (b)

Young, G. C., & Morgan, R. T. T. Overlearning in the conditioning treatment of enuresis. *Behaviour Research and Therapy,* 1972, *10,* 419–420.

Zaleski, A., Gerrard, J. W., & Shokeir, M. H. K. Nocturnal enuresis: The importance of a small bladder capacity. In I. Kolvin, R. C. MacKeith, & S. R. Meadow (Eds.), *Bladder control and enuresis.* Philadelphia: W. B. Saunders, 1973.

Zaleski, A., Shokeir, M., K., & Gerrard, J. W. Enuresis: Familial incidence and relationship to allergic disorders. *Canadian Medical Association Journal,* 1972, *106,* 30–31.

Addictive Behaviors
Alcohol, Drugs, and Smoking

ROBERT S. DAVIDSON

INTRODUCTION

Several classes of behavior can be logically analyzed together under the very loose rubric *addictive behaviors*. These behaviors have in common that they can occur in normal people at low or intermediate rates and approach pathological significance only when they become excessive. The same behaviors seem strongly controlled by powerful, immediate positive reinforcement, and when they become excessive they all seem to produce changes in the individual's health status that can be termed ultimate aversive consequences (Ferster & Perrott, 1968). Such ultimate aversive consequences, although ranging in severity from interpersonal disruption through physical symptoms such as hangover, withdrawal, and even death, appear to have little real control over the behavior that produces them (especially in terms of reduction of the addictive behaviors). All of these addictive behaviors appear to have in common similar antecedents, consequences, and maintaining stimuli. In addition, addictive behaviors can become more difficult to treat or modify as other reinforcers become less effective or important in the lives of the behavers (Crowley, 1972).

Although many behaviors could conceivably be analyzed in the context of the model just described, it might be most heuristic, as well as

clinically meaningful, to focus on a few rather than all such behaviors. For this reason, although overeating, gambling, and manipulative behaviors can be analyzed similarly, they will not be dealt with in this chapter. Instead, attention will be directed to cigarette smoking and drug and alcohol abuse, all of which involve a chemical substance of abuse as well as a good fit by the behavioral model described. With each of these selected addictive behaviors, the drug abused seems by itself to provide potent and perhaps unconditioned positive reinforcement, which can thereafter become very complicated by a number of little known but suspected conditioned reinforcers. This is the crux of the difference between what previous writers have termed *psychological dependence* and *physical dependence* (Crowley, 1972; Mello, 1979). In anecdotal terms, the difference is clear in the narcotic addict who reports a "rush" that would normally only follow an actual drug injection when, instead, he or she has simply gone through the usual ritual of preparing the "works," without any actual injection. Another example is the former addict who has gone through enforced withdrawal in a particular environment (such as a college student returning home for a summer) who experiences withdrawal symptoms all over again when returning to the same environment. In both cases, behaviors once related only to drug states have been observed to occur in drug-free states. One supposition is that such behavior might be due to conditioning—more specifically, to conditioned reinforcement in the case of the drug rush and to classical conditioning of withdrawal responses.

An exhaustive behavioral analysis of each of the addictive behaviors might similarly demonstrate a large number of reinforcing, antecedent, and consequent variables that can function similarly to maintain drug-seeking and drug-ingesting behaviors. Such an analysis would be expected to reveal complex, multiple determinism of each of the behaviors in question that could depend partly on the type or set of the person, as well as on the setting (environment) in which the behavior occurs. Although it may be difficult or impossible to identify general causes of these behaviors, many factors have been identified that increase the risk of development of addictive behaviors, as well as many of their pathological consequences. It is the purpose of this chapter to elucidate these variables, to review traditional and behavioral treatments for addictive behaviors, and to demonstrate how a rational prescription might assign treatment based on etiology or patient characteristics.

DEFINITION OR DIAGNOSIS

Although each of the disorders reviewed here can most conservatively be defined or diagnosed as a pharmacological disorder, this is perhaps a costly oversimplification. Pharmacological definitions pivot about tolerance and dependence (Mello, 1979). Dependence is usually

assessed as the presence of an abstinence syndrome or withdrawal symptoms when the substance of abuse is withdrawn. Both tolerance and dependence have been objectified and are measurable, although they apply best to narcotic, barbiturate, and alcoholic use.

From the behavioral point of view, pathological behavior in general can be defined as any behavior that is not reinforced by the environment or reinforcement community (Davidson, 1979; Sandler & Davidson, 1973). This allows for the cultural and subcultural adjustments that make the drinking of alcohol normal at a cocktail party but pathological on the job or in church. It also helps explain the source of many of our problems with drugs in this culture, which provides reinforcement for the use of drugs in many contexts but does not provide feedback to users to indicate when they have "had enough." From this same definition, abstinence can be labeled pathological in some environments (e.g., at a cocktail party), whereas excessive use might be pathological in most environments.

It might be most constructive to view addictive behaviors in terms of their physiological, clinical-medical, psychological, and behavioral concomitants. Such a broad-based definition would be more consistent with the view that alcoholism is "a chronic disease manifested by repeated implicative drinking so as to cause injury to the drinker's health or to his social or economic functioning" (Keller, 1962, p. 316). This type of definition has the advantage of enabling a holistic evaluation of function in psychological, social, and general physical-health areas. Since previous research (Baker & Lorei, 1978; Doleys, Groves, & Davidson, 1979; Frederiksen & Simon, 1979) has indicated that addictive behaviors frequently produce symptoms or pathological function in each or all of these areas and that changes in the same areas are often observed following effective treatment, the broad-based definition offers advantages over the pharmacological criteria. In addition, the broad-based definition is consistent with models of multiple determinism and multiple-risk factor analysis, both of which can be very useful with addictive behaviors.

Although more research is needed, several means of assessment of addictive behaviors, including behavioral, physical, biochemical, clinical-medical, and psychometric, have been developed (Doleys et al., 1979; National Council on Alcoholism, 1972). Some of these means of assessment, particularly when combining several valid measures, can aid the diagnostician in differentiating addictive from nonaddictive behaviors (Millon, 1969, 1977; National Council on Alcoholism, 1972). In addition, such multiple assessment programs are increasingly used in identifying or predicting individuals who will be at risk to drop out of a treatment program, to develop symptoms of a serious nature, or to respond with success or failure to treatment (Kissin, Platz, & Su, 1971; Mozdzierz, Macchitelli, Conway, & Krauss, 1973). Identification of risk factors or antecedents that predict the development of addictive behaviors can contribute importantly to programs of primary prevention, where the goal is to maintain healthy functioning and to avoid addictive

problems. Isolation of such antecedents and risk factors can also contribute directly to the rational planning of secondary prevention or direct treatment programs. Rational planning can consist of prescribing a treatment of choice depending on the patient's characteristics, such as reinforcement history, etiology, and risk factors. The actual prescription might assign exercise, relaxation training, and a drug-free environment for persons who are physically unfit, muscularly tense, and overly controlled by an environment conductive to drug use. The goal of such treatment programs would be to reduce the risk of complications, future morbidity, and death resulting from addiction, as well as to return the person to healthy living whenever possible.

SCOPE OR INCIDENCE OF ADDICTIVE BEHAVIORS

Ours is a pharmacologically oriented society, where drugs of one kind or another are frequently regarded as the treatment of choice for problems ranging from the common cold and insomnia to chronic diseases such as coronary heart disease, hypertension, and multiple sclerosis. Valium and librium, two tranquilizers, are among the most abused drugs in our country today (Stimmel, Cohen, & Hanbury, 1978). This suggests that many of our citizens look to drugs for methods to relax instead of to natural means. The social and cultural reinforcement thus provided have brought drug-taking behavior within the range of normal behavior (Farber, 1966; Sandler & Davidson, 1973).

Alcoholism, drug abuse, and smoking are among the nation's major health problems. Recent estimates number the alcoholics in the United States at about 10 million or 4–8% of the population (National Institute on Alcohol Abuse and Alcoholism, 1978; Wilkinson, 1970).

The World Health Organization (1975) estimated that control of cigarette smoking would lead to a larger increase in longevity and improved health than any other single action in preventive medicine. According to U.S. government reports, the proportion of adult male smokers has declined from 53% in 1964 when the first surgeon general's report on smoking was issued, to 39% in 1975 (U.S. Public Health Service, 1976). The proportion of adult female smokers has not changed as much (from 32 to 29% in the same period, 1964 to 1975).

It has been estimated that the frequency of narcotics addiction in the general population of the United States is about one person per 3,000 but that the rate is higher among some population subgroups (e.g., physicians, residents of large cities, and about eight times more males than females; (Davison & Neale, 1974). There were an estimated 620,000 narcotics addicts in 1975, of whom 74% were male, 170,000 in treatment of some sort, and 76,800 on methadone. A more recent report (Bourne, 1978) noted decreases in availability and purity of heroin, number of deaths due to overdose, demand for treatment, and crime rate.

POTENTIAL RISKS OF UNTREATED SMOKING, DRUG, AND ALCOHOL ABUSE

Each of the drugs involved in smoking, drug, and alcohol abuse gives rise to immediate and long-range effects. Many of the immediate effects can involve complex alterations in the central nervous system and changes in physiology, behavior, and subjective, phenomenological states. Each of these effects can be implicated as serving reinforcing functions. For example, in the case of alcohol, the first effects of drinking are signs and symptoms of inebriation or intoxication, which are dose dependent, can at first involve depression of inhibitory areas of the brain, and produce an experience of excitation, exhilaration, or behavioral disinhibition and feelings of stimulation, tension reduction, sociability, and well-being (Docter & Perkins, 1961; Steffen, Nathan, & Taylor, 1974). Larger doses depress larger areas of the brain, interfere with complex thought processes, impair motor coordination, balance, speech, and vision, increase anxiety, and produce loss of consciousness, sedation, sleep, and (beyond the lethal dose) death (Wallgren & Barry, 1970).

Narcotics and barbiturates are also central nervous system depressants and can induce similar effects, but with more sedation and analgesia. There is very little medical evidence that narcotic drug addiction *per se* produces significant physical or mental disease. Withdrawal from heroin, for example, has been compared to a mild to moderate case of influenza, although withdrawal from barbiturates or alcohol can produce severe symptoms, convulsions, and death. Besides analgesia, heroin produces few pharmacological effects other than severe constipation alternating with diarrhea. Most other effects (e.g., loss of appetite, weight loss, malnutrition, susceptibility to infectious disease) are probably indirect effects (Ausubel, 1958; Jaffe, 1970).

Nicotine is perhaps the most complex of the substances considered here, producing central nervous system stimulation but both stimulation and depression of the peripheral autonomic nervous system. With the novice, nicotine can produce nausea and vomiting, and with the tolerant it can produce sympathomimetic physiological responses (increases in heart rate, blood pressure, and cardiac output) and a variety of psychological effects including tranquilization, stimulation, and complex subjective effects. The specific pattern of effects depends to some degree on the set or personality of the smoker and the setting or psychosocial environment in which smoking occurs (Gritz & Siegel, 1979).

Despite the variety of physiological, behavioral, and subjective effects produced by these drugs, they have each been demonstrated to have unconditioned primary reinforcing properties in experimental preparations where animals such as monkeys depressed levers to self-inject the drug into the bloodstream (Deneau, Yanagita, & Seevers, 1969). In addition, each drug can involve conditioned or unconditioned negative rein-

forcement functions that increase the probability of drug use by decreasing aversive stimulation ranging from mild withdrawal reaction to pain and severe reactions. Conditioned positive reinforcement has been observed in situations where heroin addicts prepare a hypodermic needle of inert material and prepare a vein to be injected but do not actually inject the substance. Nevertheless, they frequently report feeling a "rush," as if the real drug were actually injected. Similarly, alcoholics drinking a solution they are told contains alcohol have reported feeling a reduction in tension and anxiety although no alcohol is actually consumed.

These reinforcing functions can be important in the etiology and maintenance of addictive behaviors and should contribute to the rational design of therapy, in which specific forms of treatment are matched to specific reinforcement histories, etiologies, or other patient characteristics.

Epidemiological reports have isolated many risk factors of each of these disorders that increase the probability of more severe pathology and subsequent or consequent death. Each of these disorders has been discovered to be life threatening, substantially increasing the risk of morbidity and/or death through complex, little-known mechanisms. Alcoholics are 12 times as likely as nonalcoholics to die of cirrhosis of the liver, 6 times as likely to commit suicide, 3 times as likely to die in an automobile accident, and 2 times as likely to die of coronary heart disease or cancer as nonalcoholics (the latter because most alcoholics also smoke cigarettes excessively; Cooper, 1977; Hollis, 1974; Miller & Munoz, 1976; National Institute of Alcohol Abuse and Alcoholism, 1978; Wallgren & Barry, 1970).

The health risks of smoking have been increasingly documented since the first surgeon general's report (U.S. Public Health Service, 1964), which revealed the link between cigarette smoking and cancer, the second leading cause of death in the United States today. Smoking is the major cause of lung cancer, 75% of which could be avoided by quitting or not smoking in the first place (U.S. Public Health Service, 1974).

The rate of deaths attributed to heroin overdose has risen dramatically—by 50% in the 1950s, by 70% by 1969, and by 80% by 1970. These deaths, however, do not appear to be a direct result of injecting a particularly powerful dose of pure heroin. Estimates of what constitutes a lethal dose range from 120 to 350 mg. By contrast, the average dose contained in a New York City "bag" is only 10 mg. Most packets of heroin found near the bodies of dead addicts do not differ from this usual dose. Addicts are at high risk to die of suicide, violence, and other causes that should be ruled out by coroners. Although many deaths are attributed directly to heroin overdose, the most direct evidence is often the alleged history of addiction. Several hypotheses as to the real causes of these "heroin overdose" deaths are (1) the potentiation between alcohol and heroin, (2) malaria or hepatitis, both of which can result from contaminated needles, and (3) the use of quinine to cut or dilute heroin since

an epidemic of malaria in New York City in 1939 led to the use of quinine, which can cause a rapid flooding of the lungs with fluid.

Barbiturates are the second most common class of drugs to which people become addicted. Tolerance and dependence can develop rapidly, and withdrawal reactions can be severe (much more severe than withdrawal from heroin) and can cause tremors, hallucinations, and death.

At the other end of the continuum, there are no known and conclusively demonstrated medical and/or psychological consequences of the use of marijuana or cocaine, not even tolerance and dependence. Even with heroin, some addicts have been reported who do not develop major medical consequences, particularly if they eat regularly and live an otherwise healthy life (Ausubel, 1958; Zinberg, Harding, Stelmack, & Marblestone, 1978).

PROBLEMS WITH TRADITIONAL TREATMENTS OF ADDICTIVE BEHAVIORS

Rates of improvement in addictive behaviors following traditional treatments have not been impressive. None of the traditional forms of treatment has been effective with an overwhelming majority of smokers, alcoholics, or addicts of other kinds. However, none of the treatment techniques yet developed, including behavioral techniques, has been generally effective with unselected groups of addicts. This has been especially true with narcotics addicts.

Results and follow-up data from 84 treatment programs of various orientations in smoking, heroin, and alcoholic addiction found an increasing probability of relapse in all but 20–30% of cases studied (Hunt, Barnett, & Branch, 1971). This review focused only on cases that had reached abstinence from the abused substance by the end of the treatment. The finding was that each of the groups of smokers, alcoholics, and heroin addicts tended to relapse. An average of 20–30% maintained abstinence for up to 3 months, after which there was less change. This indicates that there is great room for improvement in most forms of treatment for addictive behavior. In addition, it might be helpful to assess other factors besides abstinence that might be importantly involved in recovery.

Alcoholism

Let us review the state of the art in alcoholism first, since there is a longer history and slightly more effectiveness with alcoholics than with smokers or drug addicts. The whole issue of treatment effectiveness is clouded and complicated in the area of addictive behaviors by the following factors: (1) lack of rigorous research design; (2) lack of appropriate

controls; (3) Lack of treatment outcome goals and measurement; and (4) Lack of assessment programs that might enable prediction of important outcomes, such as attrition and treatment success.

In a review of 384 studies of treatments of alcoholism, Emrick (1974) found that only very few of the studies met the kinds of criteria listed above. Most studies, for example, did not use random assignment to treated and control groups, which limits the generalizability of results. The majority of the studies did not use control groups but simply reported the outcome of treatment for one treated group, which makes it impossible to determine improvement beyond base rates of change. The base rate itself can be a critical problem, as revealed by early studies that reported low rates of change (e.g., 1–10%) in untreated alcoholics, partly because these authors reported only change from drinking to total abstinence (Kendell & Staton, 1965; Lemere, 1953). When overall improvement and moderate drinking are accepted as general forms of improvement, the reported rates of change vary between 13 and 41% (Emrick, 1975).

In a recent large-scale study of a sample of 8 of 44 alcoholic treatment programs funded by the National Institute for Alcohol Abuse and Alcoholism (NIAAA, 1978), the Stanford Research Institute (Ruggels, Armor, Polich, Mothershead, & Stephen, 1975) found greater rates of improvement following complete psychiatric inpatient treatment than incomplete, minimal, or no treatment at the same centers. Perhaps of even greater interest was the general finding that alcoholics who continued to drink moderately after treatment, even though they might have been severely "physically addicted" before treatment, were at no greater risk for a relapse than were abstinent patients.

In an analysis of the treatment outcome of over 1,000 patients seen at seven different treatment facilities in Canada, it was found that patient characteristics predicted a greater part of the variance due to differences in treatment outcome than did differences in treatment type. Treatment techniques including inpatient and outpatient care, individual and group psychotherapy, drugs, family care, day-care, and occupational therapy were used, in various combinations, by the facilities reviewed. Many of the patients had severe symptoms at the outset, but those who had maintained social stability, were in treatment longer, and received group, rather than individual, psychotherapy were more likely to be successful (Smart, 1978a).

Another group of Canadian investigators (Kissin et al., 1971), using a sample of almost 500 alcoholics, reported that the subjects given choices between several different standard treatment modalities showed greater success than those assigned to treatment without a choice. Outcome data showed that socially and psychologically stable patients profited most from psychotherapy, whereas the least stable tended to choose and profit from standard ward treatment. Socially stable but less intelligent (primarily blue-collar alcoholics) responded best to drug therapy, whereas

psychologically sophisticated but socially disrupted patients showed more progress in standard ward programs.

In a recent study, 37 successfully and 46 unsuccessfully treated male alcoholics judged the effectiveness of six standard treatment methods routinely offered by a state hospital (Hoffman, Noem, & Petersen, 1976). Both groups of patients agreed in their ratings of the treatments, which they ranked in the following order (by percentage): group therapy (54%), individual counseling (26%), work therapy (17%), detoxification (16%), lectures (16%), and family therapy (13%). Although these data cannot be accepted as indicating the actual effectiveness of therapy, they show an interesting parallel to the study cited above (Kissin *et al.*, 1971) and to others that have found group therapy most effective with the largest number of alcoholics.

Drug Addiction

Like the studies of treatment outcome in alcoholism just reviewed, research with narcotics and barbiturate addicts, as well as polydrug abusers, has found that none of the traditional treatment techniques has been overwhelmingly successful with a majority of any addict subtype. With addicts, as with alcoholics, certain types of treatment appear to be more successful than others, and they are probably more successful with certain specific subtypes of addicts. In a long-term follow-up study of narcotics addicts treated at Lexington, Kentucky, Vaillant (1970) reported that legal parole, methadone maintenance, and Synanon offered the best treatment potentials; all of these share social prohibition of drug-taking behavior, legal sanction, and close, prolonged supervision. However, the relapse rate at Lexington averaged over 90% at 6- to 12-month follow-ups, although later abstinence was often predicted by preaddiction employment and lack of criminality. The same author suggested that the natural history of drug addiction is about 10 years, after which an increasing number of addicts become abstinent. An estimated 2% of all addicts become abstinent every year, according to Vaillant, often through loss of supply, coercion, or finding a more socially acceptable substitute (Vaillant, 1970).

Reporting on data from 44,000 drug addicts admitted to the Drug Abuse Reporting Programs (DARP) sponsored by the National Institute on Drug Abuse (NIDA), Sells (1978) found methadone maintenance and therapeutic community programs were most effective, leading to 30 and 37% abstinence, respectively. By comparison, drug-free, detoxification, and intake procedures alone produced 20–30% abstinence. Methadone maintenance and therapeutic community programs also produced improvement in legitimate employment, reductions in criminality, and decreased drug use, although drug-free programs and intake only did not show significant differences. Time in treatment, type of discharge, per-

formance during treatment, social responsibility, and socioeconomic status were also predictors of outcome.

Baker & Lorei (1978) recently reviewed the treatment outcome data of programs offered to over 8,000 drug-abusing patients by the Veterans Administration. Eleven-month follow-up data on 2,607 patients treated in 1973 at 49 centers showed 89% using drugs less, heroin use reduced from 55 to 16%, weekly salary increased from $66 to $76, and other general improvements. A later 6-month follow-up of 645 patients treated at 7 alcohol, 7 drug, and 10 combined programs found that the combined programs produced slightly less favorable outcome than did the individual drug or alcohol programs. The overall results indicated 55% abstinence in 448 alcoholics, heroin use decreased from 62 to 17%, medical problems reduced from 23 to 11%, and illegal acts decreased from 50 to 17%. These VA programs were generally traditional combinations of group and individual therapy combined with methadone maintenance for heroin addicts.

Synanon is a multimodal, self-help approach to drug addiction designed after Alcoholics Anonymous by a former AA member (Yablonsky, 1965; Yablonsky & Dederich, 1965). Former addicts are usually residential in the program for long periods of time, during which they may receive confrontation and ridicule for drug use, good jobs and praise for drug-free periods, modeling of appropriate behaviors and group reinforcement of constructive behavior. Early indications were that 25% of first admissions from 1958 through 1962 maintained abstinence for at least 2 years. Like AA, Synanon is not research oriented, making it difficult to secure definitive assessment of outcome.

Smoking

Traditional approaches to cigarette smoking cessation have used group and individual psychotherapy or counseling, physical examination, education, persuasion, scare tactics, and medication, singly or (more often) in combination. Most of these approaches have been made available to the public in community clinics that often meet for 10 days to 2 weeks, assign a time near the end of the program for cessation of smoking, and then collect follow-up information. Success rates at the end of the program have ranged from 54 to 88%, but these successes (generally only subjects reporting abstinence) usually decrease to 20–25% by the end of 6 months (Ejrup, 1963, 1965; Hunt & Matarazzo, 1970).

It would appear from these reports that nonspecific factors like the expectation of success or improvement, contact with a therapist, and suggestion are sufficient to produce intitial change but not necessarily long-lasting change. The general conclusion can only be that antismoking clinics have not proven to be of much more value than a person's sincere efforts to stop smoking alone. There are now millions of exsmokers in this country, most of whom have quit without the assistance of a formal

program. There must be a better way to help those who want to cut down or quit to reach their goals.

In summary, traditional treatments of alcoholism, drug addiction, and smoking have not been as successful as one might wish, and many have not been any more effective than placebo or other types of nonspecific procedures. One review found that groups of smokers, alcoholics and heroin addicts all tended to relapse to an average of 20–30% maintained abstinence by 3 months, after which there was not much change (Hunt *et al.*, 1971). This indicates that there is great room for improvement in most forms of treatment for addictive behaviors. In addition, it might be helpful to assess other factors besides abstinence or drug use by itself, since there might be many other correlates of a return to a healthy life.

BEHAVIORAL APPROACHES TO ADDICTIVE BEHAVIORS

Behavioral forms of treatment have the advantages of being more empirical, experimental, pragmatic, and consistent with basic learning psychology than are traditional forms of treatment. This increases the chances of rational selection of a type of therapy designed to modify those conditions that gave rise to the behavior in the first place or are currently maintaining it. Experimental and functional analysis are the preferred tools of the behavioral scientist in the search for appropriate therapeutic variables (see Davidson, 1979, and Sandler & Davidson, 1973, for an extended discussion). Unfortunately, experimental analysis of addictive behaviors has not received much attention until very recent years and has barely begun in drug addiction and cigarette smoking.

Nevertheless, a general philosophy has developed that conceptualizes addictive behaviors as under the control of potent reinforcement that must be modified, perhaps in concert with reinforcement of competing, incompatible, or generally more constructive behaviors. In some cases, specific reinforcement of constructive, healthy behaviors (ranging from shaping of specific nondrug behaviors to counseling, physical-conditioning, or jogging programs) has been found to be at least minimally effective.

Although extinction programs have been effective in reducing or eliminating behaviors in the laboratory, they have not been successful with addictive behaviors (Davidson, 1974; Ferster & Skinner, 1957). However, it should not be assumed that detoxification or other programs that simply remove the substance of abuse meet the criteria of extinction, since drug seeking and related behaviors should be allowed to occur without reinforcement in order to satisfy a procedural definition of extinction.

Aversive conditioning treatment techniques of many kinds have

been developed for reduction or elimination of addictive behaviors (Callner, 1975; R. S. Davidson, 1973; W. S. Davidson, 1974; Doleys *et al.*, 1979). These programs have ranged from electrical and chemical aversion of both classical and operant conditioning varieties to covert sensitization and combinations of aversion with other techniques. Nausea-inducing chemical aversion has been applied to more alcoholics than most other behavioral procedures, with long-term outcomes revealing between 40 and 60% abstinence over periods as long as 10 years (Lemere & Voegtlin, 1950). Although controlled clinical trials with this technique have not been reported, this treatment can still be recommended for middle-aged, middle-class alcoholics with sufficient means to pay a stiff fee and without severe medical or psychological complications.

Electrical forms of aversion, although frequently effective by themselves, continue to be controversial and perhaps are best used as one component of multimodal therapy (Blake, 1965; R. S. Davidson, 1973, 1974). Because of ethical objections and the lack of controlled clinical trials, both chemical and electrical forms of aversive conditioning can only be recommended as treatments of last resort after most other possible forms of treatments have been exhausted or tried without avail. Neither chemical nor electrical aversion has been demonstrated to be effective in drug addiction or in cigarette smoking (Callner, 1975; Frederiksen & Simon, 1979).

Covert sensitization (Cautela, 1967) uses aversive scenes as imagined aversive events, often combined with relaxation, visualization of constructive (nonaddictive) behaviors, and negative reinforcement of the latter. Although the technique has much to recommend its use, it has not been demonstrated effective enough by itself with any of the addictive behaviors to be a treatment of choice (R. S. Davidson, 1974; Frederiksen & Simon, 1979).

Counterconditioning programs, though complex, have much to recommend them because they combine extinction or aversion for addictive behaviors with reinforcement of nonaddictive behaviors. Token economies, contingency management and self-control programs have been among the most frequently used treatments. These programs have been individually tailored for each of the addictive behaviors, as well as being frequently found as important or primary components of behavioral ward treatment programs (Callner, 1975; Doleys *et al.*, 1979; Frederiksen & Simon, 1979).

Moderation Training

One of the primary contributions of behavioral programs to the assessment and treatment of addictive behaviors has been training in moderation. Since the early reported finding that some alcoholics could return to controlled drinking at subintoxicating levels (Davies, 1962), later reports have replicated this finding in untreated patients (Bailey &

Stewart, 1967; Kendell, 1965; Lemere, 1953) and in patients treated with
psychotherapy in both in- and outpatient settings (Emrick, 1975; Popham
& Schmidt, 1976; Ruggels et al., 1975).

Improvement in areas not related to drinking has often been reported
to occur in nonabstinent graduates of alcoholic treatment programs (Be-
lasco, 1971; Pattison, 1966; Rohan, 1970). In addition, abstinence has
been found in some follow-up studies to be unrelated or even negatively
related to improvement in general (Emrick, 1974; Foster, Horn, & Wan-
berg, 1972; Gerard, Saenger, & Wile, 1962; Pattison, 1966). It seems that
many alcoholics would opt for a controlled-drinking program rather than
one with abstinence as the only goal (Ewing, 1974; Lloyd & Salzberg,
1975; Miller & Munoz, 1976; Sobell & Sobell, 1974). A controlled-
drinking strategy might be the treatment of choice for those patients who
opt for nothing else, and perhaps also for those on whom all other treat-
ment efforts have been ineffective. A review of treatment outcome
studies has suggested that only a minority of alcoholics achieve and
maintain total abstinence (Emrick, 1974, 1975), that especially young
patients have done poorly in abstinence programs (Voegtlin & Broz,
1949), and that, even following controlled-drinking programs, many
clients have chosen and maintained total abstinence (Ewing, 1974; Mil-
ler, 1976; Vogler, Compton, & Weissbach, 1975).

In a recent study of 1,091 alcoholics who drank socially after treat-
ment, Smart (1978b) found that these patients had lower alcohol consump-
tion rates, fewer problems due to drinking, less alcoholic involvement,
were older, had greater marital and social stability, better self-image,
better attitudes toward achieving abstinence, and higher motivation
for treatment than those who remained nonsocial drinkers or those
who became abstinent. Of the total group, 6.1% became true social
drinkers, whereas 7.5% established less than complete control. Patients
who opt for controlled drinking programs and show these characteristics
in addition might be the best candidates for controlled-drinking program
success.

In a recent assessment by the RAND Corporation of the effectiveness
of 44 NIAAA-funded alcoholic treatment programs, it was found that a
large proportion of treated patients became controlled drinkers, even
though that was not the treatment goal of most of the programs (Ruggels
et al., 1975). The major contributions of these programs was reported to
have been an improvement in overall effectiveness and a reduction in
total alcohol consumption. Controlled drinkers were found to be at no
greater risk to return for further treatment than were abstinent patients.

Similar conclusions emerged from a review of 384 alcoholic treat-
ment studies (Emrick, 1975). This review also found that the major con-
tribution of treatment (mostly of traditional types, such as group and
individual psychotherapy, standard ward psychiatric treatment, and drug
treatment) was to reduce total consumption of alcohol and to add to
overall improvement.

Because of all these findings, several behavioral forms of treatment have been developed and aimed specifically at the goal of controlled drinking. These forms of treatment have used discrimination training, biofeedback, aversive conditioning, and combinations of these and other techniques aimed at the development of self-control (Doleys et al., 1979).

In one interesting form of therapy, alcoholics are trained to order mixed rather than straight (undiluted) drinks and to sip rather than gulp drinks (Mills, Sobell, & Schaefer, 1971). Drinking too much and/or violating these basic control principles leads to a punishment shock of unpredictable intensity if patients drink enough to increase their blood alcohol level to near the intoxicated range (Huber, Karlin, & Nathan, 1976).

In one nonaversive approach to controlled drinking, alcoholics are simply trained to pause an increasing amount of time between small and dilute drinks (Bremser & Davidson, 1977). This was done in a rigorous way with alcoholic patients pulling a plunger to automatically deliver alcohol, but it could conceivably be done with less automation and instrumentation. Some alcoholics have learned a new pattern of controlled, slow drinking in this manner.

In a broad-spectrum program combining ward therapy, avoidance conditioning with electric shock, videotaped feedback, behavioral rehearsal, stimulus control training, and lists of personal" do's and don'ts," controlled drinkers were found to show more improvement and to maintain it longer than ward controls or alcoholics who elected abstinence as a therapy goal over 3 years of follow-up (Sobell & Sobell, 1973, 1978).

These and similar programs show promise for those alcoholics who show some probability of learning controlled drinking. They should be replicated with more patients in controlled clinical trials when the data warrants it. In addition, they should be explored much more than they have been in smoking and drug addiction.

In narcotics addiction behaviors, the standard treatment goal is abstinence, just as it is with most other addictive behavior treatment programs. However, an increasing amount of data indicates not only that controlled use of narcotics is possible but that it can occur under many conditions. For example, of 571 Vietnam veterans, 20% reported occasional use of narcotics, and only 12% of this sample reported that they ever used narcotics after returning home. An additional sample of 153 occasional users was reported who had maintained nonaddictive controlled use of narcotic drugs (mainly heroin) (Zinberg et al., 1978). These and other controlled users reported mechanisms of self-control such as self-directions to keep the frequency of use low (e.g., once per day, weekends only, etc.), not to use enough to become addicted, to use only in safe environments (not with pushers, not while driving, etc.), to be careful of sanitary and antiseptic conditions with drugs and needles, to stick to rituals, and other similar sanctions. The authors' conclusions were that controlled users probably have adopted more internalized sanctions than have addicted individuals.

With regard to cigarette smoking, several experimental studies have demonstrated the possibility of modifying smoking topography and perhaps of reducing the overall rate of smoking, but only a small minority of smokers have been able to keep their rates low without accelerating to higher rates (Frederiksen & Simon, 1979). Previous studies have found that smoking components such as puff frequency, puff duration, interpuff interval, cigarette duration, and total amount of the cigarette consumed could all be modified experimentally on a short-term basis. In addition, some preliminary case studies have been done in which individuals were instructed to modify their smoking behavior in such ways as taking fewer puffs or shorter puffs. (Frederiksen & Simon, 1979). Results from these studies have shown controlled smoking maintained over 5- to 8-months' follow-up.

A number of studies have also investigated stimulus control or self-control procedures for reducing or stopping smoking. In some studies, smoking has been confined to one geographical environment or to an interval of time since the last ciagrette (Nolan, 1968; Upper & Meredith, 1970). These procedures also need further exploration.

In short, moderation training appears altogether possible with each of the addictive behaviors, although it has been investigated much more extensively with alcoholics than with drug addicts or smokers. Data from polls and epidemiological studies indicate that most people in the United States probably drink alcohol in a controlled, nonintoxicating fashion, that a large number of cigarette smokers have decreased their overall rate of smoking or have switched to safer forms of smoking since the 1964 surgeon general's report, that a large number of our population may use barbiturate, tranquilizing, and/or narcotic drugs without abusing them or taking more than prescribed. Perhaps more extended and intensive investigation of how all these people control their drug intake might help fashion the goals and techniques of future treatment for those who more clearly abuse substances.

Multiple Risk Factor Reduction

Another of the major contributions of behavioral medicine has been the identification of risk factors and their use in treatment. Epidemiological studies have now established the types of morbidity and mortality to which addictive behaviors can lead. In addition, similar studies have found some risk factors for the development of each of the types of addictive behavior. Significant improvement in the overall health and well-being of individual patients can be achieved by major emphases on risk factor reductions, which have in some cases produced overall improvement.

For example, a recent large and well-designed program (Farquhar *et al.*, 1977) used educational programming on the mass media (radio, television, newspapers, and posters) regarding risks involved in smoking,

diet, and hypertension in two northern California communities. The information was withheld from a nearby town in the same area as a control procedure. Improvements were found in information (26 to 40% increase) and in smoking habits and cholesterol levels, although no change was observed in body weight. Individual counseling with persons at highest risk led to greater increases in information (52%) and greater decreases in smoking and cholesterol levels.

Previous epidemiological studies have discovered risk factors that predict increased probabilities of an individual becoming an alcoholic. Two reviews (Cahalan, Cisin, & Crossley, 1969; National Council on Alcoholism, 1972) have suggested that the following are such risk factors: a family history of alcoholism; a family history of teetotalism; a history of a broken home; being the last child or in the last half of the birth order in a large family; a history of alcoholism or teetotalism in the spouse or spouse's family; being Protestant or of no specific religious denomination; being Catholic or without religion; being of Irish, Scandinavian, Latin American, Italian, or British origins; lower social-status men aged 45–49, who completed high school but not college and are single, divorced, or separated.

In primary prevention programs, persons identified as being at risk on the factors above might be counseled in ways to avoid developing addictive behavior. Such programs are of most use with persons or populations at risk to develop such pathology. Persons at risk can often be identified once the risk factors are known. This usually depends on the amount of research that has been done in the area.

Several similar factors that enable prediction of tobacco smoking are exposure to smoking models (especially parents, but also peers), peer pressure to smoke, extraversion, antisocial and impulsive orientation, age, education, level of aspiration, risk taking, and goal direction (Danaher & Lichtenstein, 1978; Eysenck, 1965). Each of these factors might also be used in primary prevention programs designed to help people avoid smoking in the first place.

The factors predicting the development of narcotics addiction may be similar to those in alcoholism. That is, drug addicts, like alcoholics, may tend to come from broken homes, to be exposed to models of drug use (parents or peers), to be male, and to be from lower socioeconomic and educational classes. In addition, drug addicts may show predisposing factors such as lack of involvement in organized groups, socialization to nontraditional norms, involvement with drug-using peers, a passive orientation, and a thrill-seeking acting-out of impulses. Less work has been done in programming of primary prevention programs for potential drug addicts than for potential smokers and alcoholics (Gorsuch & Butler, 1976).

Programs of secondary prevention attempt to stabilize or reverse pathological conditions that have already developed. Once the mechanisms of etiology are well known, a rational treatment of choice

might match the mechanism of action of treatment with the etiological mechanism. For example, if it were known that modeling is the main mechanism in the etiology, or the "cause," of addictive behavior, most of the treatment emphasis could be put on models of abstinent or moderate behavior. In addition, by reducing the risk factors that would otherwise predict the development of future increased morbidity and/or death, such secondary prevention programs might decrease the probability of such future sequelae.

As mentioned earlier, the major risks of future pathology or death associated with alcoholism are cirrhosis of the liver, suicide, death in an automobile accident, and death resulting from coronary heart disease or cancer. Since many of these risks are dose dependent, reduction of alcohol consumption, especially reduction to subintoxicating levels, is consistent with reduction of consequent risk, longer life and general health.

Stimulus control programs have often been helpful in teaching persons when, where, how, and how much to drink within socially acceptable limits. To the extent that such programs function to modify a person's alcoholic intake in the direction of socially acceptable norms or limits, they reduce risk and increase the probability of reinforcement, social acceptability, and health.

A recent self-control manual has developed a strategy and several specific techniques adaptable to controlling or eliminating drinking problems (Miller & Munoz, 1976). Many of these same techniques might as effectively be applied to problems of drug addiction or tobacco smoking. Persons with problems are warned to set limits and to attempt to drink moderately, to eat before and during drinking, to count drinks and try not to drink more than the national average (2–3 drinks per day), to sip and enjoy drinks rather than gulping them, to drink diluted drinks spaced over time, and to make contractual agreements with oneself and/or others regarding specific goals. Antecedents to drinking, such as places, times, and people in association with which drinking usually occurs should be avoided. Alternatives such as water and nonalcoholic beverages should be sought and salty foods or activities that increase thirst avoided. Activities and life-styles that increase boredom, exhaustion, or frustration should be avoided, as they might also increase drinking. Anger, lack of assertion, tension, and depression should be avoided or treated, for the same reason. Training in relaxation, assertion, and prosocial behaviors, as well as therapy for depression, low self-esteem, creative mind games, self-reward, and self-control might be helpful in supplying workable substitutes for drinking.

Effective professional treatment might incorporate techniques such as the above, but they might also be especially recommended for individuals who do not have access to professional help through hospitals, clinics, or other agencies.

As already mentioned, such techniques might also be applied to other addictive behaviors. With narcotics addicts, use of self-control

mechanisms in treatment might well lead to reduced risk of medical, social, and legal consequences of drug taking. For example, to the extent that drug users are cautious about when and where they take drugs, they should be able to escape or avoid detection and legal consequences. To the extent that they use sanitary precautions, they should also be able to avoid medical risks and complications.

Cigarette smokers can best reduce their risk of medical illness and complications by quitting smoking. National statistics indicate that there might be as many as 22 million exsmokers who have done just that (U.S. Public Health Service, 1976). In addition, there has been a nationwide trend to shift to "safer" cigarettes. In 1954, only 10% of all cigarettes sold were filter-tipped. By 1970, this proportion had increased to 80% (Wynder & Hoffman, 1972). Indications are that although low-tar and low-nicotine cigarettes might decrease the risk of cancer, they might actually increase the risk of coronary heart disease through their higher carbon monoxide yield (Wald, 1976). In addition, switching to cigars or pipe smoking can decrease the risk of both cancer and coronary heart disease, especially if the smoker does not inhale.

Horn (1969) suggested that the following methods of cutting down or quitting smoking might be best fitted to the types of smokers indicated: (1) for those who smoke mainly for stimulation, try exercise (a brisk walk or moderate exercise) instead of a cigarette; (2) for those who like manipulating, holding, and handling something, toy with a pen or a paper clip, doodle, or get a plastic cigarette or holder to handle; (3) for those who smoke mainly for relaxation, try relaxation-training exercises or meditation; generally, exercise and covert control by thinking about the damage smoking can do to one's lungs and body can be helpful in reducing or eliminating the smoking habit; (4) for those who smoke mainly to reduce stress, anxiety, or discomfort, try exercise, relaxation, or meditation in place of smoking, and be careful not to start again under future stress; (5) for smokers who feel frequent craving or psychological addiction, try quitting cold turkey (all at once) or try spoiling your taste for cigarettes by smoking twice your usual number for as long as you can, and then quit; try smoking and alternating between six different brands of cigarettes, mixing one extreme with the other (e.g., follow a filter-tipped menthol with a turkish cigarette); (6) for those smokers who smoke mainly out of habit, automatically, stop and record each cigarette (the number of cigarettes smoked each day can be surprising), and ask, "Do I really want this cigarette?" before lighting it; if this does not help decrease smoking, try reminders of the damage each cigarette does.

The American Cancer Society (1970) suggests the following ways that might help one quit smoking: list reasons for and against smoking, select a specific day to quit smoking, change to a low-tar and low-nicotine cigarette, chart smoking habits for at least 2 weeks, repeat before each cigarette one of the reasons for not smoking, eliminate the cigarettes you need least, try cigarette substitutes (mints, gum, ginger root, etc.), provide

rewards (e.g., a movie, dinner, or new clothes) on the day of quitting, exercise, and take deep breaths. If depression or anxiety results, a physician should be consulted, but quitting smoking never hurt anyone and is much less dangerous and less in need of medical supervision than quitting alcohol or other drugs.

A recent self-help manual (Danaher & Lichtenstein, 1978) enumerates several behavioral techniques to help one quit smoking. Among the suggestions are making a contract with oneself and/or others to quit by a certain date, promising to forfeit a preset amount of money if the contract is violated, rapid smoking until ready to quit, paced smoking while listening to tapes that detail the procedure and benefits of quitting, thinking of the damage caused by smoking and the benefits of quitting, thinking of ideal ·or relaxed states, relaxation training, decreasing urges to smoke, recording and keeping a chart of daily progress. Each of the foregoing techniques, to the extent that it helps the smoker cut down, switch to a safer cigarette, or quit smoking, should also decrease the risk of medical and associated complications of smoking.

SUMMARY

This chapter has analyzed addictive behaviors from the point of view of behavioral medicine, finding a similarity in definition and controlling variables of alcoholism, drug addiction, and smoking. Each was found to occur at extreme or pathological rates in this culture, with about 30% of the population smoking, 10% alcoholic, and 5% addicted to drugs. It was found that each of these behaviors can lead to medical, physiological, and psychological consequences as severe as death. Risk factors have been discovered that predict the development of each disorder, as well as risk factors that predict the development of medical and associated consequences. Appropriate treatments can often reduce these risks. No treatments have been found, however, that are generally effective with the majority of treated patients. To the extent that more can be discovered regarding risk factors and etiological mechanisms in each disorder, a rational assignment of the treatment of choice made on the basis of individual patient characteristics might become available. Until that time, several behavioral treatment techniques were recommended that have been found effective with addictive or other behaviors. In addition, others were recommended that seem to make sense but on which little or no research has been collected.

REFERENCES

American Cancer Society. '71 Cancer facts and figures. American Cancer Society, 1970.
Ausubel, D. P. Drug addiction: Physiological, psychological, and sociological aspects. New York: Random House, 1958.

Bailey, M. B., & Stewart, J. Normal drinking by persons reporting previous problem drinking. *Quarterly Journal of Studies on Alcohol*, 1967, *28*, 305–315.

Baker, S. L., & Lorei, T. W. Evaluation of treatment effectiveness: Veterans Administration experience. *Annals of the New York Academy of Sciences*, 1978, *311*, 253–264.

Belasco, J. A. The criterion question revisited. *British Journal of Addiction*, 1971, *66*, 39–44.

Blake, B. G. The application of behaviour therapy to the treatment of alcoholism. *Behaviour Research and Therapy*, 1965, *3*, 75–85.

Bourne, P. G. General overview of narcotic addiction treatment programs. *Annals of the New York Academy of Sciences*, 1978, *311*, 147–152.

Cahalan, D., Cisin, I. H., & Crossley, H. M. *American drinking practices: A national survey of drinking behavior and attitudes.* New Brunswick, N.J.: Rutgers Center of Alcohol Studies, 1969.

Callner, D. A. Behavioral treatment approaches to drug abuse: A critical review of the research. *Psychological Bulletin*, 1975, *82*, 143–164.

Cautela, J. R. Covert sensitization. *Psychological Record*, 1967, *20*, 1115–1130.

Cooper, K. H. *The aerobics way.* New York: M. Evans, 1977.

Crowley, T. J. The reinforcers for drug abuse: Why people take drugs. *Comprehensive Psychiatry*, 1972, *13*, 51–62.

Danaher, B. G., & Lichtenstein, E. *Become an ex-smoker.* Englewood Cliffs, N.J.: Prentice-Hall, 1978.

Davidson, R. S. Comparative analyses of aversive conditioning in alcoholism. In J. H. Masserman (Ed.), *Current psychiatric therapies.* New York: Grune & Stratton, 1973.

Davidson, R. S. Alcoholism: Experimental analyses of etiology and modification. In K. S. Calhoun, H. E. Adams, & K. M. Mitchell (Eds.), *Innovative methods in psychopathology.* New York: Wiley, 1974.

Davidson, R. S. (Ed.). *Modification of pathological behavior: Experimental analyses of etiology and behavior therapy.* New York: Gardner Press, 1979.

Davidson, R. S., & Bremser, R. F. Controlled alcoholic drinking: Differential reinforcement of low rates of drinking. *Behavior Modification*, 1977, *1*, 221–234.

Davidson, W. S. Studies of aversive conditioning for alcoholics: A critical review of theory and research methodology. *Psychological Bulletin*, 1974, *83*, 571–581.

Davies, D. L. Normal drinking in recovered alcohol addicts. *Quarterly Journal of Studies on Alcohol*, 1962, *23*, 94–104.

Davison, G. C. and Neale, J. M. Drug addiction and drug dependence. In G. C. Davison and J. M. Neale (Eds.), *Abnormal Psychology: An experimental clinical approach.* New York: John Wiley & Sons, 1974, 233–270.

Docter, R. and Perkins, R. B. The effects of ethyl alcohol on autonomic and muscular responses in humans. I. Dosage of 0.5 milliliter per kilogram. *Quarterly Journal of Studies on Alcohol*, 1961, *22*, 374–386.

Doleys, D. M., Groves, J. A., & Davidson, R. S. Behavioral approaches to the assessment and modification of alcoholic behavior. In R. S. Davidson (Ed.), *Modification of pathological behavior: Experimental analyses of etiology and behavior therapy.* New York: Gardner Press, 1979.

Ejrup, B. A proposed medical regimen to stop smoking: *Swedish Cancer Society Yearbook*, 1963, No. 3, 483–473.

Ejrup, B. Treatment of tobacco addiction: Experiences in tobacco withdrawal clinics. In American Cancer Society, Can we help them stop? American Cancer Society, 1964.

Emrick, C. D. A review of psychologically oriented treatment of alcoholism. I. The use and inter-relationships of outcome criteria and drinking behavior, following treatment. *Quarterly Journal of Studies on Alcohol*, 1974, *35*, 523–549.

Emrick, C. D. A review of psychologically oriented treatment of alcoholism. II. The relative effectiveness of different treatment approaches and the effectiveness of treatment versus no treatment. *Journal of Studies on Alcohol*, 1975, *36*, 88–108.

Ewing, J. A. Some recent attempts to inculcate controlled drinking in patients resistant to

Alcoholic Anonymous. *Annals of the New York Academy of Sciences*, 1974, *233*, 147–154.

Eysenck, H. J. *Smoking, health and personality*. London: Widenfeld & Nicholson, 1965.

Farber, L. H. Ours is the addicted society. *The New York Times Magazine*, December 11, 1966, 21.

Farquhar, J. W., Maccoby, N., Wood, P. D., Alexander, J. K., Breitrose, H., Brown, B. W., Haskell, W. L., McAlister, A. L., Meyer, A. J., Nash, J. C., & Stern, M. P. Community education for cardiovascular health. *Lancet*, 1977, *1*, 1192–1195.

Ferster, C. B., & Perrott, M. C. *Behavior principles*. New York: Meredith, 1968.

Ferster, C. B., & Skinner, B. F. *Schedules of reinforcement*. New York: Appleton-Century-Crofts, 1957.

Foster, F. M., Horn, J. L., & Wanberg, K. W. Dimensions of outcome following treatment of problems associated with the use of alcohol. *Quarterly Journal of Studies on Alcohol*, 1972, *33*, 1079–1099.

Frederiksen, L. W., & Simon, S. J. Clinical modification of smoking behavior. In R. S. Davidson (Ed.), *Modification of pathological behavior: Experimental analyses of etiology and behavior therapy*. New York: Gardner Press, 1979.

Gerard, D. L., Saenger, G., & Wile, R. The abstinent alcoholic. *Archives of General Psychiatry*, 1962, *6*, 83–95.

Gorsuch, R. L., & Butler, M. C. Initial drug abuse: A review of predisposing social psychological factors. *Psychological Bulletin*, 1976, *83*, 120–137.

Gritz, E. R., & Siegel, R. K. Tobacco and smoking in animal and human behavior. In R. S. Davidson (Ed.), *Modification of pathological behavior: Experimental analyses of etiology and behavior therapy*. New York: Gardner Press, 1979.

Hoffman, H., Noem, A. A., & Petersen, D. Treatment effectiveness as judged by successfully and unsuccessfully treated alcoholics. *Drug and Alcohol Dependence*, 1976, *1*, 241–246.

Hollis, W. S. On the etiology of criminal homicides: The alcohol factor. *Journal of Police Science and Administration*, 1974, *2*, 50–53.

Horn, D. *Smoker's self-testing kit*. Public Health Service Publication No. 1904, Part 1. Washington, D. C.: U.S. Department of Health, Education, and Welfare, 1969.

Huber, H., Karlin, R., & Nathan, P. E. Blood alcohol discrimination by nonalcoholics. *Quarterly Journal of Studies on Alcohol*, 1976, *37*, 27–39.

Hunt, W. A., & Matarazzo, J. D. Habit mechanisms in smoking. In W. A. Hunt (Ed.), *Learning mechanisms in smoking*. Chicago: Aldine, 1970.

Hunt, W. A., Barnett, L. W., & Branch, L. G. Relapse rates in addiction programs. *Journal of Clinical Psychology*, 1971, *27*, 455–456.

Jaffe, J. H. Drug addiction and drug abuse. In L. S. Goodman & A. Gilman (Eds.), *The pharmacological basis of therapeutics* (4th ed.). London: Collier-MacMillan, 1970.

Keller, M. The definition of alcoholism and the estimation of its prevalence. In D. J. Pittman & C. R. Snyder (Eds.), *Society, culture and drinking patterns*. New York: Wiley, 1962.

Kendell, R. E. Normal drinking by former alcohol addicts. *Quarterly Journal of Studies on Alcohol*, 1965, *26*, 247–257.

Kendell, R. E., & Staton, M. C. The fate of untreated alcoholics. *Quarterly Journal of Studies on Alcohol*, 1965, *27*, 30–41.

Kissin, B., Platz, A., & Su, W. H. Selective factors in treatment choice and outcome in alcoholics. In N. K. Mello & J. H. Mendelson (Eds.), *Recent advances in studies of alcoholism: An interdisciplinary symposium*. Washington, D.C.: U.S. Government Printing Office, National Institute on Alcohol Abuse and Alcoholism, NIH, Pub. No. (HSM) 71–9045, 1971.

Lemere, F. What happens to alcoholics? *American Journal of Psychiatry*, 1953, *109*, 674–676.

Lemere, F., & Voegtlin, W. L. An evaluation of aversion treatment of alcoholism. *Quarterly Journal of Studies on Alcohol*, 1950, *11*, 199–204.

Lloyd, R. W., & Salzberg, H. C. Controlled social drinking: An alternative to abstinence as a
    treatment goal for some alcohol abusers. *Psychological Bulletin*, 1975, *82*, 815–842.

Mello, N. K. Animal models of alcoholism: Progress and prospects. In R. S. Davidson (Ed.),
    *Modification of pathological behavior: Experimental analyses of etiology and behavior
    therapy*. New York: Gardner Press, 1979.

Miller, P. M. *Behavioral treatment of alcoholism*. New York: Pergamon, 1976.

Miller, W. R., & Munoz, R. F. *How to control your drinking*. Englewood Cliffs, N.J.:
    Prentice-Hall, 1976.

Millon, T. *Modern psychopathology*. Philadelphia: Saunders, 1969.

Millon, T. *Millon Multiaxial Clinical Inventory manual*. Minneapolis: National Computer
    Systems, 1977.

Mills, K. C., Sobell, M. B., & Schaefer, H. H. Training social drinking as an alternative to
    abstinence for alcoholics. *Behavior Therapy*, 1971, *2*, 18–27.

Mozdzierz, G. J., Macchitelli, F. J., Conway, J. A., & Krauss, H. H. Personality characteristic
    differences between alcoholics who leave treatment against medical advice and those
    who do not. *Journal of Clinical Psychology*, 1973, *29*, 78–82.

National Council on Alcoholism. Criteria for the diagnosis of alcoholism. *American Jour-
    nal of Psychiatry*, 1972, *129*, 41–49, 127–135.

National Institute of Alcohol Abuse and Alcoholism. *Alcohol and Health. Third Report to
    the United States Congress*, Washington, D.C.: U.S. Government Printing Office, Na-
    tional Institute on Alcohol Abuse and Alcoholism, NIH, 1978.

Nolan, J. A. Self-control procedures in the modification of smoking behavior. *Journal of
    Consulting and Clinical Psychology*, 1968, *32*, 92–93.

Pattison, E. M. A critique of alcoholism treatment concepts: With special reference to
    abstinence. *Quarterly Journal of Studies on Alcohol*, 1966, Vol. 27, 49–71.

Popham, R. E., & Schmidt, W. Some factors affecting the likelihood of moderate drinking by
    treated alcoholics. *Journal of Studies on Alcohol*, 1976, *37*, 868–882.

Rohan, W. P. A follow-up study of hospitalized problem drinkers. *Diseases of the Nervous
    System*, 1970, *31*, 259–265.

Ruggels, W. L., Armor, D. J., Polich, J. M., Mothershead, A., & Stephen, M. *A follow-up
    study of clients at selected alcoholism treatment centers funded by NIAAA: Final
    report*. Menlo Park, Calif.: Stanford Research Institute, 1975.

Sandler, J., & Davidson, R. S. *Psychopathology: Learning theory, research and applications*.
    New York: Harper & Row, 1973.

Sells, S. B. Treatment effectiveness. In R. S. Dupont, A. Goldstein, & J. A. O'Donnell (Eds.),
    Handbook on drug abuse. Washington, D.C.: U.S. Government Printing Office, Na-
    tional Institutes of Health, 1978.

Smart, R. G. Do some alcoholics do better in some types of treatment than others? *Drug and
    Alcohol Dependence*, 1978, *3*, 65–75. (a)

Smart, R. G. Characteristics of alcoholics who drink socially after treatment. *Alcoholism:
    Clinical and Experimental Research*, 1978, *2*, 49–52. (b)

Sobell, M. B., & Sobell, L. C. Individualized behavior therapy for alcoholics. *Behavior
    Therapy*, 1973, *4*, 49–72.

Sobell, M. B., & Sobell, L. C. Alternatives to abstinence: Time to acknowledge reality.
    Addictions, 1974, *21*, 2–29.

Sobell, M. B., & Sobell, L. C. *Behavioral treatment of alcohol problems*. New York: Plenum
    Press, 1978.

Steffen, J. J., Nathan, P. E., & Taylor, H. A. Tension-reducing effects of alcohol: Further
    evidence and some methodological considerations. *Journal of Abnormal Psychology*,
    1974, *83*, 542–547.

Stimmel, B., Cohen, M., and Hanbury, R. Alcoholism and polydrug abuse in persons on
    methadone maintenance. *Annals of the New York Academy of Sciences*, 1978, *311*,
    99–109.

United States Public Health Service. *Smoking and health: Report of the Advisory Commit-
    tee to the Surgeon General of the Public Health Service*. Washington, D.C.: U.S. Gov-

ernment Printing Office, United States Department of Health, Education and Welfare, Publication No. 1103, 1964.

United States Public Health Service. *The health consequences of smoking: 1974.* Washington, D.C.: United States Department of Health, Education and Welfare, 1974.

United States Public Health Service. *Adult use of tobacco: 1975.* Washington, D.C.: U.S. Government Printing Office, United States Department of Health, Education and Welfare, 1976.

Upper, D., & Meredith, L. *A stimulus control approach to the modification of smoking behavior.* Proceedings of the 71st annual convention of the American Psychological Association, 1970, *5* (Part 2), 739–740.

Vaillant, G. E. The natural history of drug addiction. *Seminars in Psychiatry,* 1970, *2,* 486–498.

Voegtlin, W. L., & Broz, W. R. The conditioned reflex treatment of chronic alcoholism. X. An analysis of 3125 admissions over a period of ten and a half years. *Annals of Internal Medicine,* 1949, *30,* 580–597.

Vogler, R. E., Compton, J. V., & Weissbach, T. A. Integrated behavior change technique for alcoholics. *Journal of Consulting and Clinical Psychology,* 1975, *43,* 233–243.

Wald, N.J. Mortality from lung cancer and coronary heart disease in relation to changes in smoking habits. *Lancet,* 1976, *1,* 136–138.

Wallgren, H., & Barry, H. *Actions of alcohol (Vol. 2) Physiological and psychological aspects.* New York: Elsevier, 1970.

Wilkinson, R. *Prevention of drinking problems: Alcohol control and cultural influences.* New York: Oxford University Press, 1970.

World Health Organization. *Expert committee on mental health. Alcoholism subcommittee: Second report.* Geneva: World Health Organization, 1952.

World Health Organization. *Smoking and its effects on health.* Report of a World Health Organization expert Committee, Geneva, Switzerland, 1975.

Wynder, E. L., & Hoffman, D. Less harmful ways of smoking. *Journal of National Cancer Institute,* 1972, *48,* 1740–1891.

Yablonsky, L. *Synanon: The tunnel back.* Baltimore, Md.: Penguin, 1965.

Yablonsky, L., and Dederich, C. Synanon: The structure of antiaddiction society. In D. M. Wilner & G. G. Kassebaum (Eds.), *Narcotics.* New York: McGraw-Hill, 1965, pp. 193–216.

Zinberg, N. E., Harding, W. M., Stelmack, S. M., & Marblestone, R. A. Patterns of heroin use. *Annals of the New York Academy of Sciences,* 1978, *311,* 11–22.

CHAPTER 15

Sexual Disorders

C. EUGENE WALKER

INTRODUCTION

The techniques available for treating sexually troubled individuals have
undergone rapid and dramatic change in the last decade or two. Most of
the literature prior to this abounds with interpretations of sexual dys-
function based on Freudian and psychodynamic theory. Earlier treat-
ments of choice were lengthy psychoanalysis or intensive
psychodynamic therapy and the outcome was admitted to be poor.
Virtually all of the recent developments in this area assume a learning
theory etiology for sexual dysfunction and prescribe direct behavioral
treatment. Length of treatment has correspondingly decreased, and suc-
cess rates have risen so that most sex therapists can now approach their
patients with considerable optimism regarding the outcome of treatment.
The present chapter will survey some of the more effective treatment
approaches that are applicable to a variety of sexual disorders.

CHARACTERISTICS OF THE THERAPIST

The characteristics of the sex therapist are crucial. It is extremely
important that the sex therapist be thoroughly familiar with current re-
search and information regarding sexual behavior, as myths and fallacies
abound in this area. In addition, it is important that the therapist be
comfortable with his or her own sexuality and in sufficiently good control

C. EUGENE WALKER • Department of Psychiatry and Behavioral Sciences, University of
Oklahoma Medical School, Oklahoma City, Oklahoma 73069.

of his or her own emotions, reactions, feelings, and attitudes so that they do not interfere with treatment.

Sexual therapy is rapidly becoming a specialty and should not necessarily be attempted by any qualified psychotherapist or professional. In referring patients for sexual therapy, one would be well advised to check carefully the credentials, background, training, and reputation of the therapist to whom the patient is being referred. There are a large number of reputable sexual therapy centers and training centers throughout the country. However, there are also a number of centers in which inadequately trained therapists offer therapy in an often ill-advised and inept manner.

Many therapists, such as Masters and Johnson (1970) recommend a dual-sex therapist couple in the treatment of sexual disorders, especially if a married couple is involved. It is their position that this facilitates communication and therapy in many important ways. Masters and Johnson even insist that one member of the therapeutic couple be a physician. Other therapists, however, have disagreed with the need for a physician and have questioned whether or not a couple is needed for such therapy (Annon, 1974; Kaplan, 1974b). Nevertheless, most experienced clinicians agree that a dual-sex couple is often very helpful. However, in many settings the cost of employing two therapists is prohibitive. Therefore, more data is needed to determine whether the cost–benefit ratio is sufficient to suggest that a dual-sex couple be manditory for such situations.

AUDIOVISUAL MATERIALS

A number of companies have prepared audio and video tapes, films, pamphlets, and other materials that are useful in training therapists in the techniques of sexual therapy and in illustrating procedures and techniques for patients. For example, the Multi-Media Resource Center (*Multi-Media Resource Center Book List*, 1979) has a wide variety of materials that are explicit in their depiction of sexual behavior and highly instructional. Several films based in the work of Hartman and Fithian (1972) are available from the Center for Marital and Sexual Studies (*Treatment of Sexual Dysfunction*, 1972). A similar series based largely on the work of Masters and Johnson is available from EDCOA Productions (*Sexual Counseling*, 1976). Excellent human sexuality films prepared for classroom presentation in professional schools are available from John Wiley and Sons (*Human Sexuality*, 1973) and Williams and Wilkins (Miller, 1974). A series of slides and tapes are available from the Behavioral and Educational Consulting Corporation (*Sexual Compatibility*, 1978) that deal in a sensitive way with the feelings of men and women about sex throughout the life span, from adolescence to old age. The films are useful to stimulate discussion with couples or small groups.

Additionally, the Behavioral and Educational Consulting Corporation has published a behaviorist's kit entitled *The Use of Guided Phantasy in Sexual Therapy* (Fabbri, 1977) that is designed to lead a patient, step by step, through an imaginary hierarchy of scenes involving social and sexual interaction. Finally, the Audio-Digest Foundation has produced a very helpful audio tape entitled *Management of Sexual Dysfunction* (1978).

ASSESSMENT

Interviewing

A careful assessment of the individual's sexual functioning and dysfunctioning are needed in order for therapy to proceed intelligently and effectively. Numerous guides have been prepared for the initial interview and assessment of sexual dysfunctions. Notably, Masters and Johnson have presented a sexual history outline and examination procedure in their classic work *Human Sexual Inadequacy* (1970). In addition, the Group for the Advancement of Psychiatry (1973) has prepared an interviewing guide for dealing with the sexually disturbed patient, Hartman and Fithian (1972) have developed a series of diagnostic experiences and examinations, and several of the contributed chapters in Green's *Human Sexuality: A Health Practitioner's Text* (1975) offer helpful tips.

Tests and Questionnaires

Although there are a variety of tests and questionnaires available that are sometimes used in evaluating the sexually dysfunctional individual, most of the available instruments are lacking in data regarding reliability, validity, and interpretation.

Some of the more useful instruments for clinical use include the Sex Knowledge and Attitude Test (Lief & Reed, 1971), the Thorne Sex Inventory (Thorne, 1965), Locke–Wallace Marital Adjustment Inventory (Locke & Wallace, 1959), and the Oregon Sex Inventory (LoPiccolo, 1972; Steger, 1972). Several questionnaires and check lists relating to dating, sex knowledge, and marital adjustment are also available from Family Life Publications (Durham, North Carolina).

The author of this chapter has under development a new assessment instrument, The Sex Form, specifically designed for evaluating sexually dysfunctioning people. The Sex Form consists of 324 true–false items that were selected from a larger pool assembled by examining the literature for all studies in which item analysis and questionnaire studies were done with contrasting groups of sexually disordered individuals. In addition, some new items were constructed to fill logical gaps that existed in the pool constructed in that manner. From the original pool, items were selected that were thought to sample a wide variety of sexual behaviors

including nonaggressive sexual deviance, aggressive sexual deviance, sex drive, conservative versus liberal values, gender identity confusion, fantasy versus action potential, romanticism, sex guilt, impulse control, receptivity to therapy, sex knowledge, marital happiness, and overall adjustment. Data are currently being gathered for this instrument with the intention of refining it for use in clinical and research settings. The basic test strategy to be employed will be contrasting groups in a manner similar to that in which the Minnesota Multiphasic Personality Inventory (MMPI) was constructed. It is hoped that, once completed, a clinician or researcher will be able to administer The Sex Form to a subject and be capable of plotting a profile relating to the subjects sexual adjustment, attitudes, and behaviors that would be similar to an MMPI profile, with the exception that it will deal exclusively with sex-related behaviors. Since the instrument is currently in the developmental stages, it is not available for clinical use. However, arrangements will be made with researchers to use the instrument in projects if they request it of the author.

Scaling Techniques

Mosher (1979) has done extensive work on the measurement of guilt, including sex guilt. Over the years numerous researchers have developed Guttman type scales of sexual behavior. A couple of the more recent efforts in this area are those of Zuckerman (1973) and Bentler (1968a,b). These scales are often useful in evaluating therapy outcome.

Physiological Measures

Zuckerman (1971) has reviewed the literature on physiological measures of sexual arousal, concluding that penile tumescence as measured by a penile plethysmograph (Laws & Pawlowski, 1973) and vaginal blood volume (Hoon, Wincze, & Hoon, 1976) are probably the most reliable and valid measures.

Behavioral Analysis

Most behavioral psychologists are familiar with and rely on behavioral analysis as a part of the assessment process (Goldfried & Linehan, 1977). Such as analysis appears to be even more important in sexual dysfunction than in other areas of treatment. Human sexuality is a unique area of human functioning in terms of the biological underlay, emotional overlay, the variety of taboos, mores, and laws that apply to it, and the conflicting ideas, confusing demands, and ambiguous attitudes that pertain to it. These factors can result in the development of very unusual, unpredictable, and peculiar patterns of behavior. Such patterns might well be overlooked in the absence of an extremely thorough be-

havioral analysis. More extensive discussions of behavioral analysis appear in Holland (1970), Kanfer and Saslow (1965), and Kanfer and Grimm (1977). Kiresuk and Sherman (1968) have discussed the procedure of behavioral goal setting in terms of determining the goals to be achieved and methods of assessing whether or not the outcome has been successful, which is very useful in sexual therapy. Barlow (1977) also provides an overview of the behavioral assessment of sexuality.

Medical Consultation

Most sexually dysfunctioning individuals are not organically impaired. The vast majority of sexual dysfunctions result from psychogenic causes. In addition, in many cases, behavioral treatment can compensate for even an organic condition. Thus, although a competent sexual therapist will see that expert medical attention is given the client prior to and during therapy, in the vast majority of the cases the behavioral treatment will be the predominant one and the only one that will offer much help.

MARITAL ENRICHMENT

Many couples who have been married for a long time discover that their relationship has deteriorated and no longer provides them with a sense of excitement, joy, and meaningfulness. They often find that their overall relationship has become cordial, but distant, and that sex has become boring. This state of affairs is exemplified by a folk theory of the duration of sexual excitement in marriage:

> Starting on your wedding night and continuing through the first year of your marriage, put one bean in a jar for every time you have intercourse. Starting with the beginning of your second year of marriage, take one bean out of the jar for every time you have intercourse. When you die there will still be some beans left in the jar. (Martin, 1970, p. 326)

General Principles

In dealing with marital-enrichment cases, the professional therapist must realize that the nonsexual adjustment problems are generally found to be more important than the sexual adjustment problems. Thus, counseling such individuals on specific techniques to heighten sexual arousal or enjoyment is likely to be less successful than working with them in reestablishing good communication, good will, and vitality in their overall relationship. Once the overall relationship improves, the sexual dimension of the relationship might automatically become more exciting. If not, the therapist can move on to that area with more specific tech-

niques. In improving the overall relationship of the couple, it is important
to first become aware of the particular complaints, irritants, grudges, and
so on, that each harbors with respect to the other and that have resulted
in their drifting apart. These need to be thoroughly uncovered and dis-
cussed. The general task of the therapist at this time is to enable the
couple to air previous offenses and irritants in order to place them to rest
and to begin interacting with one another with a spirit of good will and in
a manner that provides good communication. Margolin and Weiss (1978)
have described a system using videotape feedback and prompting to im-
prove communications between marital partners. Behavioral contracting
is often very helpful in dealing with many of the issues that will need to
be resolved during this process (Jacobson, 1977; Knox, 1971).

Bibliotherapy

Many therapists find bibliotherapy very helpful in dealing with the
sexual areas in marital-enrichment counseling. McCary and Flake (1971)
have summarized the basic principles of bibliotherapy in sexual counsel-
ing and recommend a number of excellent sources for this type of
therapy. The present author has found the following sources helpful in
enabling couples to deal with and improve their sexual relationships: *The
Joy of Sex* and *More Joy* (Comfort, 1972, 1974), *The Pleasure Bond* (Mas-
ters & Johnson, 1975), *Sex Therapy at Home* (Kass & Stauss, 1975, *Total
Orgasm* (Rosenberg, 1973), and *Cosmopolitan's Love Book* (Wagner,
1972).

One technique that the present author has used to advantage is to
have a couple read the same book, underlining with different colored
pencils or pens, areas that they think are particularly important or mean-
ingful. Often, just seeing what the other underlines is a useful means of
communication and understanding. Following the reading and underlin-
ing, the couple can go back over those areas and discuss them. Many
times, one or both members of a couple has difficulty bringing up a topic
of concern. This method provides them with an opening to discuss sensi-
tive areas.

TREATMENT OF FEMALE SEXUAL DYSFUNCTION

There are two major categories of female sexual dysfunction: painful
intercourse (or attempted intercourse) and orgasmic dysfunction. Within
each of these general categories are several subcategories and variations
that are clinically significant, requiring differential diagnosis and treat-
ment. Many clinicians and researchers consider some or all of the sub-
categories as separate entities (e.g., Kaplan, 1974a). For the purposes of
this chapter, however, they have been combined.

Dyspareunia

Painful intercourse (dyspareunia) includes a range of problems: (a) uneasiness during the period of time in which the penis is penetrating the vagina; (b) an experience of mild to severe painful sensations during intercourse; and (c) spastic contraction of the pelvic musculature and the musculature of the outer third of the vagina to the extent that penetration and intercourse are impossible (vaginismus).

As Masters and Johnson (1970) have emphasized, many cases of severe pain during intercourse can be the result of organic problems including an intact hymen, bruised remnants of the hymenal ring, gland base enlargement in the Bartholin's gland area, inadequate lubrication, postmenopausal loss of elasticity, smegma beneath the clitoral foreskin, vaginal infection, sensitivity reactions to intravaginal contraceptives, laceration of ligaments supporting the uterus, pelvic infection, endometriosis, postsurgical complications, tumors of the uterus, and carcinoma of the female reproductive tract, to name but a few.

Treatment in these cases is primarily medical. A psychogenic etiology for such pain must be established by exclusion. However, mild discomfort during penetration is frequently psychogenic in origin, and some cases of painful intercourse appear to result from mild cases of muscular spasm similar to that causing vaginismus (Masters & Johnson, 1970). In such cases sexual reeducation and reassurance appear warranted as part of the treatment. In addition, relaxation training and systematic desensitization would have obvious applications due to the likelihood that phobic elements contribute to the problem. Wolpe's (1958) technique of having the patient proceed with sexual activity until it is no longer pleasurable, then terminating it and attempting it again on another occasion, is a common behavioral approach to this problem. The general pleasuring and sensate focus procedures employed by Masters and Johnson (1970) are strikingly similar to Wolpe's methods. Both are basically forms of *in vivo* desensitization (Laughren & Kass, 1975).

Vaginismus

Masters and Johnson (1970) have reported complete success in the treatment of vaginismus, which is virtually always psychogenic in origin, using insertion into the vagina of successively larger Hegar dilators. Elgosin (1951) has reported success by having the patient insert fingers and manually stretch the vagina. Generally, within a few days of treatment with the above methods, the spastic constriction of the vaginal outlet is relieved and intercourse becomes possible. These procedures also essentially involve a type of *in vivo* desensitization. Relaxation training and systematic desensitization can be very helpful in enhancing the process. Also, sexual reeducation and counseling of a didactic nature are helpful.

Orgasmic Dysfunction

Orgasmic dysfunctions in females take several forms, ranging from relatively mild to severe. In the earlier literature, these disorders were all subsumed under the term *frigidity*. However, as Kaplan (1974a) and others have pointed out, use of this term is really inappropriate for the majority of orgasmic dysfunctions that females experience. As a result, the term has fallen into general disuse by current sexual therapists. Orgasmic disturbances in females range from the sexually unresponsive woman who is essentially devoid of erotic feelings or responses and who avoids any significant degree of closeness or affection, to females who respond well to affection but who experience no pleasant sensations from genital stimulation or sexual intercourse, to women who respond favorably to affection and sexual activity but who achieve orgasm only a small percentage of the time or only under certain circumstances (e.g., with direct stimulation of the clitoris). Only individuals in the first category could legitimately be designated frigid, and only a very small fraction of the women who experience sexual difficulty fall into this category. Such women appear to have general neurotic problems that extend beyond the sexual and due to the pejorative connotations of the term frigidity, most therapists currently do not use the term at all.

Sexual reeducation, reduction of fears and inhibitions, improvement of the overall marital relationship, and communication are a part of virtually all treatment approaches to the above dysfunctions. However, these approaches are seldom sufficient in and of themselves to resolve the difficulty. As was the case with problems involving painful intercourse, relaxation training and systematic desensitization (Sotile & Kilmann, 1978) have been employed for the treatment of orgasmic dysfunction. However, these approaches have enjoyed only modest success.

Treatments of Orgasmic Dysfunction

Structured Programs. Masters and Johnson (1970), Hartman and Fithian (1972), Kaplan (1974b), and others have developed highly structured sexual training programs that have been found to be successful in the treatment of orgasmic dysfunction. It is beyond the scope of this chapter to detail these procedures, but current data are clear in suggesting that these procedures are the treatments of choice for such dysfunction. Several authors (Barbach, 1974; Wallace & Barbach, 1974) have reported success in group therapy employing reeducation and exercise procedures similar to those employed in the above treatments.

Masturbation Training. LoPiccolo and Lobitz (1972), Zeiss, Rosen, and Zeiss (1977), and others (e.g., Kohlenberg, 1974) have reported on procedures involving prolonged training sessions of masturbation to overcome orgasmic dysfunction. In these treatments, the female is encouraged to stimulate herself for prolonged periods of time daily until

orgasm occurs. Once the orgasmic response is well established through these procedures, the female is introduced by successive approximations to orgasm during sexual intercourse. These procedures are very similar to those employed by Masters and Johnson (1970) and others, except that in the Masters and Johnson procedure the stimulation is by the male partner, whereas in these procedures the initial stimulation is by the female herself. Some authors (e.g., LoPiccolo & Lobitz, 1972) have also reported successful use of vibrators to produce orgasm in the anorgasmic female. Although some success has been reported with vibrators, there has not been sufficient research to demonstrate their effectiveness. In addition, many women are reluctant to use these methods. Discussion about their feelings and reasons for such reluctance often provides a vehicle for sexual reeducation by the therapist.

Muscle Exercises. Some sex therapists (Hall, 1952; Kegel, 1952) have found it helpful to recommend exercises to strengthen the pubococcygeal muscle in assisting the woman to overcome a lack of orgasm. The theory behind this treatment is that if the pubococcygeal muscle is not well developed and in good tone, there is not sufficient contact with the penis to produce arousal sufficient to induce orgasm. The exercise recommended is for the female to practice starting and stopping the flow of urine while toileting until she becomes aware of the muscles involved. Following this, it is recommended that this exercise be done several times during the day while not urinating. Another approach to this technique employs a periniometer developed by Kegel (1952) and consisting of a tube that is inserted into the vagina and connected to a meter indicating the amount of pressure exerted. Using this feedback, the female can practice the development of the muscle.

Positive Conditioning. In a more general vein, a very promising approach to treatment of many sexual difficulties has been proposed by Beech, Watts, and Poole (1971) that uses positive conditioning. Positive conditioning involves identifying a condition that is capable of eliciting sexual responsivity in the client and then arranging for the transfer of that sexual arousal through an associative or conditioning process to the desired stimuli. For example, Asirdas and Beech (1975) induced arousal in females by means of a vibrator and a tape recording of a male voice describing sexual intercourse in romantic terms with a background of romantic music while the female fantasized sexual intercourse with her own partner. The intent was to produce positive conditioning of sexual arousal to the desired stimuli. This could potentially be used for a wide variety of sexual disorders both of normal dysfunction and deviancy.

Hypnosis. Hypnosis has been employed with some success (Leckie, 1964; Levit, 1971; Richardson, 1963; Segel, 1970), but most of the reports in this area tend to be single-case studies and do not provide conclusive evidence as to effectiveness. In clinical practice, the author has found hypnosis to be very useful in a variety of ways. One procedure involves hypnotizing the subject and having her recall under hypnosis the first

experience she can remember that has any connotation of being sexual in nature. The patient then recounts the experience in detail. Following a complete reconstruction of the experience, the therapist is able to assist the patient in cognitive restructuring of the incident by means of reeducation and reinterpretation.

Hypnosis can also be employed to enable the patient to become more comfortable with her own body and to view her body in a positive manner. Many women, especially those experiencing sexual difficulty, tend to have negative attitudes regarding their bodies and are not accepting of their own femininity. Under hypnosis, the client can be encouraged to take a positive attitude toward any good features of her body and be reassured regarding any features that she might feel are negative. Sensory awareness exercises, involving concentration on genital sensations and reduction of inhibition, can also be accomplished under hypnosis.

Miscellaneous Techniques. McCarthy (1977) has reviewed strategies for reducing sexual anxiety in females and Munjack and Oziel (1978) have discussed the basic types of resistance to behavioral treatment of sexual dysfunction that occur and have suggested means for overcoming these sources of reluctance. Wishnoff (1977, 1978) described the application of self-management principles to the treatment of sexual dysfunctions, as well as the use of modeling. In addition, various clinicians (Jankovich & Miller, 1978; Sotile, Kilmann, & Follingstad, 1977) have claimed success in a variety of encounter groups and intensive-workshop experiences for the treatment of sexual dysfunction. However, data regarding the effectiveness of such procedures is largely absent.

Types of Orgasm

There has been considerable discussion in the early literature regarding the difference between vaginal and clitoral orgasms, with clitoral orgasm being considered a feature of the sexually immature female. At a later date, Masters and Johnson (1966) concluded from their data that there was no difference physiologically in the responses of females experiencing orgasm by either means. More recent evidence suggests that there may, indeed, be two types of orgasm. The vaginal orgasm appears to be produced by stimulation of the Grafenberg spot (located at the 12 o'clock position on the anterior wall inside the vagina between the posterior side of the pubic bone and the cervix). Orgasms produced in this way are experienced as deeper, involving contractions of the uterus, and in about 10% of women are accompanied by an ejaculation of seminal-like fluid (Perry & Whipple, 1981). Obviously much more data are needed before the final answer will be obtained in this area. Results of therapy indicate that some women who are initially unable to achieve orgasm can learn to do so through exercises (Hartman & Fithian, 1972; Kaplan, 1974b; Masters & Johnson, 1970). However, most studies reporting success with anorgasmic females report that direct clitoral stimulation is generally required to produce orgasm, because intercourse alone does not supply suf-

ficient stimulation for such women. This is not to be regarded as an unhealthy or inferior condition but can simply represent a different physiological level of functioning. Kaplan (1974b) has suggested several procedures for stimulating the clitoris before, during, and after intercourse for women who need such stimulation. Thus, the sexual therapist should be aware of the variations in female responsiveness to various types of stimulation, the female's preference for various types, and the procedures that can capitalize on the types preferred.

Early marital-manual literature suggested that simultaneous orgasm was the goal for all fully adjusted couples and represented the peak experience in sexual encounters. However, it is now clear that relatively few couples are sufficiently well matched physiologically in their responsivity to achieve that goal very often, and many clinicians (Kaplan, 1974b) argue that such an achievement may not even be desirable. There can be advantages in terms of maximal pleasure for one partner to concentrate on providing orgasm for the other and then on achieving it for himself or herself (McCary, 1973).

Whereas a decade ago, treatment of sexual dysfunction in females was very difficult and success was very modest, current behavioral methods have produced outstanding results in up to 90% of the cases.

SEXUAL DYSFUNCTION IN THE MALE

Several major sexual dysfunctions can befall males, including lack of sexual drive or interest, erectile failure (impotence), premature ejaculation, retarded ejaculation, and ejaculatory incompetence. In each of these disorders it is, of course, important to rule out any possible organic factors. This should be done by competent medical examination and consultation. However, the vast majority of sexual dysfunctions in males, as in females, is psychological in origin rather than organic (Mirowitz, 1966).

Lack of Sexual Drive

Assuming that organic factors have been ruled out, lack of sexual drive and interest is generally a secondary reaction to some other problem. The problem can be one of psychosis, with delusions, hallucinations, and disturbed interpersonal relationships resulting in withdrawal and interfere with normal sexual response; it can be neurotic, with anxiety, depression, and other symptoms inhibiting sexual response; it can be related to various anxiety or phobic responses to females or sex, sometimes related to underlying homosexuality; or, it can be due to insecurity and ineffective abilities in relating to females. The basic behavioral treatment of this disturbance involves treating the more basic problem first with appropriate methods discussed elsewhere in this book, such as systematic desensitization (Wolpe, 1958), assertion training (Fensterheim

& Baer, 1975), cognitive restructuring, or others, followed by positive conditioning (Asirdas & Beech, 1975), training in fantasy (Tuthill, 1955), and counseling about effective sexual techniques. This problem actually occurs much more frequently than is brought to the attention of psychotherapists. This is due to the fact that the male is expected to take the initiative in sexual encounters. If a male simply does not initiate encounters, he is generally left alone and the nature of his problem does not become apparent.

Erectile Dysfunction

Erectile dysfunction is a relatively common problem with males and may be increasing. The more commonly used term, *impotence,* appears to be a misnomer and is falling into disuse. It is certainly pejorative and an overgeneralization to refer to a male who has difficulty achieving erection as impotent. In addition, people have in the past indiscriminately applied the term impotent to males who were unable to achieve erection as well as to those with other problems, including premature ejaculation, which, physiologically, would seem to be an obvious contradiction in terms. Thus, the term *erectile dysfunction* appears to be more precise and appropriate. An additional diagnostic consideration is that once the problem of erectile difficulty occurs, it tends to be self-perpetuating and produces additional difficulties resulting in a vicious circle of fear and anxiety that contribute to lack of erection that, in turn, produces additional distress and upset, and so forth.

Although erectile dysfunction would seem to be a relatively simple and straightforward category of dysfunction, it is, as is true in many other cases, much more complicated in practice than it appears to be in theory. Several different versions of erectile difficulty occur. One of the simplest differentiations is primary versus secondary erectile dysfunction. Primary dysfunction refers to the case in which sufficient erection has never been achieved to permit intercourse, whereas secondary dysfunction occurs after successful experiences (Masters & Johnson, 1970). Many males also experience sporadic and intermittent dysfunction. How often and how long this must occur before it is considered a dysfunction rather than normal variation is still not answered. Impairment of erection can occur with or without loss of general sexual arousal and with or without ejaculatory difficulties. Likewise, many males are unable to obtain erection with some partners but have no difficulty with other partners.

Treatments of Erectile Dysfunction

Systematic Desensitization.   The classic treatment for erectile dysfunction described by Wolpe (1958) involved a type of *in vivo* desensitization in which the couple was encouraged to engage in sexual activity up to the point where anxiety or discomfort was experienced. They would then cease, relax, and start again. With continued stimulation under such

circumstances, the phobia or anxiety with respect to sexual functioning was reduced, and normal sexual behavior became possible.

Systematic desensitization using standard imagination and relaxation procedures in the office has also been employed with success, as has systematic desensitization involving hypnosis and the use of drugs (Shusterman, 1973). Masters and Johnson (1970), and others, have reported good success for their couple counseling and exercise approach in which the female stimulates the male to the point of erection, allows the erection to subside, then stimulates him again. This takes place over a period of time and with a great deal of relaxation and communication encouraged. The female then straddles the male in a sitting position and gradually eases the penis into her vagina while the male remains relaxed. Though the data are not complete enough to draw firm conclusions, the evidence seems to indicate that the Masters and Johnson approach is superior to the others available.

Anxiety Reduction.   Because performance anxiety is often an issue in erectile dysfunction, any technique that will reduce it is helpful. This can involve counseling the partners with respect to communication and comfortableness in the encounter rather than making demands; it can as Masters and Johnson (1970) point out, involve ridding oneself of the "third person" in the room observing the interaction (which, in the case of impotent men, is often themselves, judging whether or not they are getting an erection and whether or not they think it will last); or it can involve counseling the couple on alternative techniques of oral, manual, or other forms of stimulation that can be employed to achieve sexual satisfaction for the partners if intromission and intercourse are not possible on certain occasions. Often, the knowledge that there are other ways of reaching orgasm and satisfaction is sufficient to reduce the pressure to perform.

Positive Conditioning.   Positive conditioning techniques (Asirdas & Beech, 1975) have also been used for treatment or erectile dysfunction. These can involve fantasizing activities with the wife that are then followed by sexual stimulation either from erotic materials or masturbation. A related technique is to question the male carefully regarding the various fantasies that he has with respect to sexual encounters and attempting to arrange for some of these to be fulfilled by his partner in some of their encounters. Often the increased excitement from participating in a previously fantasized behavior along with the understanding that his partner is doing this for him are effective in increasing arousal and producing erection.

Biofeedback.   Biofeedback has also been employed with some success in the treatment of erectile dysfunction (Csillag, 1976; Herman & Prewett, 1974). However, there are not sufficient data to determine if it will ultimately be an effective treatment or not.

Mechanotherapy.   Various kinds of penile splints and mechanical devices (Dengrove, 1971) have been used to sustain erection sufficient for intromission and sexual activity. Some of these are dangerous, and others

are uncomfortable or reduce contact with the vagina sufficiently that little stimulation is received. However, some splints do appear to be safe and useful. Dengrove (1971) has reviewed these techniques and notes that the Eros splint can be safe and useful. In one of the more interesting experiments in this area, Cooper (1974) has reported on the use of the Blackoe "energizer," which consists of ebonite rings with five small metal plates on opposite inner surfaces. This device is fitted around the penis, scrotum, and testicles in such a way that the moist acid-containing skin of the penis and scrotum react with the metal plates, producing a small electrical output. Several males appeared to be helped by this, but since both the active and a placebo ring, which did not generate any electricity, appeared to produce similar results, it might well be that the main effect was psychological. It seems that the use of splints and possibly other mechanical means of permitting intromission need to be explored more carefully. It would be interesting to present this problem to an athletic trainer in order to see if he could devise a system for taping the penis that would produce sufficient rigidity to permit intromission and yet allow enough exposure that sensation would not be unduly hampered.

Surgical Implants.   Prosthetic devices have also been developed that can be surgically implanted in the male to correct the problem of erectile dysfunction. Some of these are stationary silicone rubber rods that provide a constant modicum of rigidity in the penis, permitting intromission (Beheri, 1966; Lash, 1968; Loeffler & Sayegh, 1960; Loeffler, Sayegh, & Lash, 1964, Pearman, 1967). Others (Kothari, Timm, Frohrib, & Bradley, 1972; Scott, Byrd, Karacan, Olsson, Beutler, & Attia, 1979) have reported the use of an implantable penile prosthesis that can be inflated and deflated. The device consists of a reservoir of fluid that is implanted under the abdominal muscle but exterior to the peritoneal cavity, a pump placed in the scrotal sac to move the fluid, and two inflatable cylinders that are implanted in the corpus cavernosum of the penis, all of which are connected by tubing. The patient activates the device by repeatedly squeezing the bulb pump in the scrotum to pump fluid from the reservoir into the cylinders in the penis. After intercourse, the patient activates a release valve in the pump by pressing a button on the pump for a few seconds. This allows the fluid to move back into the reservoir and the penis to become limp. The prosthesis is designed to produce an erection whenever the patient desires but neither contributes to nor detracts from the capability of the patient to experience an orgasm. Surgical implants are currently used primarily with males whose dysfunction has an organic basis. However, their use with psychogenic cases should not be ruled out.

Premature Ejaculation

As defined by Masters and Johnson (1970), premature ejaculation refers to the situation in which the male cannot control the ejaculatory process for a sufficient length of time during intravaginal containment to

satisfy his partner in at least 50% of their coital connections, provided that the female partner is not persistently nonorgasmic. Masters and Johnson appear to prefer this definition to any definition that depends on a specific length of time. However, the inherent subjectivity of this definition with respect to the rapidity with which the female can achieve orgasm is obvious. Some females, with sufficient stimulation and preparation, can achieve orgasm within a few seconds following intromission, whereas others can require several minutes of thrusting along with direct manual stimulation of the clitoris to achieve orgasm (Kinsey, Pomeroy, Martin, & Gebhard, 1953). Thus, exactly where does the line between premature ejaculation and orgasmic dysfunction occur? Of course, in counseling couples, it is often not necessary to make a choice. It is possible to work both with the male at delaying his ejaculation and with the female at becoming more readily able to achieve orgasm. Since the Kinsey data (Kinsey, Pomeroy, & Martin, 1948) indicate that the average male ejaculates within 2 minutes following intromission, we might as a rule of thumb assume that a male who ejaculates in less than a minute following intromission can be considered to have a problem of premature ejaculation.

Over the years, sex manuals have recommended a number of techniques for delaying ejaculation, including distracting thoughts, slower movements, and applying anesthetizing medication to the penis. Many of these procedures reduce sexual responsivity, pleasure, and enjoyment; anesthetizing creams for the penis can also anesthetise the female. It appears that the most effective treatment is the squeeze technique originally suggested by Semans (1956) and later developed by Masters and Johnson (1970). In this procedure, the female stimulates the male to the point of near orgasm, squeezes the penis to prevent orgasm, and then repeats this procedure several times in a given session. Over a period of time with this type of exercise, the male learns to delay ejaculation. Zeiss, Christensen, and Levine (1978) have reported on the use of this treatment program in a group in which only the male attended the sessions. The male then communicated with his partner regarding the exercises that they were to carry out. Group treatments of this sort for sexual dysfunction would appear to offer considerable promise. All the benefits of group support, sharing, learning from each other's experience, receiving reassurance, and related benefits of group therapy are readily available in a cost-efficient framework. Masters and Johnson (1970) report a failure rate, over an 11-year period involving 186 men, of only 2.2%.

Ejaculatory Incompetence

Ejaculatory incompetence is the reverse of premature ejaculation (Masters & Johnson, 1970). In extreme forms, the male is completely unable to ejaculate in the vagina of his partner. In other cases, ejaculation is retarded to the extent that a prolonged period of thrusting is necessary before ejaculation occurs. This becomes exceedingly tedious and upset-

ting to both partners. Masters and Johnson (1970) have pointed out that anxiety, severely orthodox religious upbringings, and general inhibitions regarding sexual activities appear to contribute to this problem. Thus, systematic desensitization and sexual reeducation often are an important part of the treatment program for these individuals. Masters and Johnson (1970) have successfully treated cases of this sort using another form of *in vivo* desensitization that involves the female manually stimulating the male to the point of ejaculation outside of the vagina, then gradually arranging for the ejaculation to take place closer and closer in proximity and eventually inside the vagina, until the male is capable of ejaculating with comfort while the penis is contained in the vagina.

Kaplan (1974b) has described what she refers to as partial ejaculatory incompetence. This is a very rare condition and can be caused in some cases by physical difficulties that are not well understood. Masters and Johnson (Kaplan, 1974b) speculate that a physical cause of this problem might somehow be related to failure of the prostate to properly fill prior to orgasm. However, it also appears to be caused in some cases by psychological difficulties. In partial ejaculatory incompetence, the male emits semen, but it seeps out rather than being ejaculated. The throbbing and intense sensation that usually accompanies ejaculation is absent. In some cases, the male experiences a degree of pleasure and satisfaction from the experience but does not experience it with the intensity that he might have in the past or that he is aware others do. In extreme cases, the male feels very little pleasure or sensation at all. Patients with this particular problem tend to refer to their orgasm as a *release orgasm* rather than a *pleasant orgasm* and sometimes complain that their penis appears to be anesthetized, with virtually no feelings during the sexual experience and ejaculation. Although a fair number of males complain of this problem from time to time, it is rare for the condition to apply to all sexual encounters of the individual.

Since this condition is relatively rare, treatment procedures are unclear. There is some speculation that sexual conflicts, anger or displeasure with the partner, homosexual desires, and other forms of psychological mechanisms might be inhibiting the normal sexual response. To the extent that this is true, elimination of these difficulties should improve the sexual relationship and alleviate the difficulty. It is also possible that exercises for contracting the musculature in the perineum, such as starting and stopping the flow of urine and elevating and lowering the erect penis, can be of assistance in alleviating this problem.

TREATMENT OF SEXUAL DYSFUNCTION IN GROUPS WITH SPECIAL HANDICAPS

The general principles of sexual counseling and therapy outlined in the previous sections have been extended to groups of patients with spe-

cific handicaps. For many years this area was studiously avoided by medical personnel. The patient's physical illness or trauma was treated with available techniques, but physicians and other staff were hesitant and embarrassed about discussing sexual matters with their patients. Also, very little data and information regarding successful handling of sexual problems in the various diseases were available. Thus, many patients suffered the added insult of sexual dysfunction along with their physical disabilities.

To a great extent, this sexual dysfunction was entirely unnecessary. There is currently a growing literature about dealing with sexual problems of special groups. Though it is impossible to go into detail for each of the groups in this chapter, the sexual therapist involved in this area should make himself or herself aware of the literature available. For example, Rowland and Haynes (1978), among others, have presented data on a sexual-enhancement program for elderly couples. Vemireddi (1978) has discussed techniques of sexual counseling for chronically disabled patients. Burnham, Lennard-Jones, and Brooke (1977) have discussed the sexual problems of patients with ileostemies. Comarr and Vigue (1978) have discussed sexual counseling for male and female patients with spinal cord injury. Griffith, Timms, and Tomco (1973) prepared an extensive bibliography on the sexual problems of patients with spinal injuries that is now somewhat out of date but extremely helpful in locating information for working with such patients. Renshaw (1978), Horgan and Craig (1978), and Johnston, Cantwell, Watt, and Fletcher (1978) have discussed sex for the cardiac patient, including complications produced by myocardial infarction, stroke, hypertension, and angina, and have concluded that most heart disease patients can lead a moderately normal sex life. Scalzi and Dracup (1978) recently reported that postcoronary patients who receive appropriate sexual counseling return to a precoronary level of sexual activity more quickly than patients who do not receive such counseling. Sidman (1977) has discussed the effects of stroke and heart disease, diabetes, muscular dystrophy, multiple sclerosis, renal disease, pulmonary disease, alcoholism, and spinal cord injury on sexual functioning and has concluded that understanding, support, and correct information are most needed from the therapist.

SEXUAL VARIANT BEHAVIOR

Early writing referred to unusual sexual practices as *sexual perversion*. More recently the term *sexual deviance* has been used to imply a statistical departure from the norm but not a moral judgment. The most recent literature tends to refer to this behavior as *sexual variation* to further emphasize the presence of a continuum of sexual behavior rather than two classes, normal and abnormal. As Groth and Burgess (1977) have commented

> Traditionally, the concept of sexual deviation has referred to any persistent departure from genital intercourse with a single partner of approximately the same age and opposite sex. Deviations have generally been defined in regard to a number of variables: the sexual object (e.g., pedophilia), the mode of gratification (e.g., exhibitionism), the intensity of the drive and the frequency of its gratification (e.g., nymphomania), and the context within which the drive is aroused and gratified (e.g., group sex). The concept of deviation has become practically synonymous with the concepts of abnormal and pathological behavior. Yet, clearly, what is sexually deviant descriptively is not necessarily psychologically pathological. The human being is an adaptive individual capable of a variety of means of sexual expression and gratification. (p. 401)

Some areas of sexual behavior, however, such as child molestation and rape, would appear to warrant stronger terminology. These appear to transcend mere variation in preference.

Etiology

The etiology of these variations is still unclear, but theoretically they would appear to follow a basic reinforcement paradigm. Because behaviors that are reinforced tend to be repeated, we would presume that stimuli present when sexual excitation and orgasm occur tend to become conditioned stimuli for sexual arousal and to be repeated. Examining case histories generally yields data supportive of this general theoretical notion. However, it would be equally possible to support a number of other theoretical positions by case histories. Some empirical support for the learning theory approach to the etiology of these disorders is provided by Rachman (1966), who used a classical conditioning paradigm involving pairing pictures of nude women with pictures of boots. Increased blood volume to the penis was the dependent measure. Rachman was able to demonstrate classical conditioning in which the boots became capable of eliciting sexual responses. McGuire, Carlisle, and Young (1965) point out that many sexual variations can become conditioned via frequent masturbation to the fantasy of the variant activity. Thus, orgasm would be paired with a stimulus with great frequency, resulting in overlearning. This is consistent with the unusually persistent nature of sexual variations and their resistance to modification. Interestingly, Masters and Johnson (1979), in their recent work on homosexuality, have adopted the position that this behavior appears to be a learned behavior.

Much has yet to be learned about the etiology of these disorders. As Fensterheim (1974) has pointed out, contrary to the dynamic formulation of such problems, etiology does not appear to play a major role or need be considered in any major way in designing a treatment strategy for these problems. There does seem to be a respect in which the behaviors become autonomous once established.

Treatment Considerations

A current issue in the area concerns the advisability of treating variations at all. Some therapists (Bieber, Dain, Dince, Drellich, Grand,

Gundlach, Kremer, Rifkin, Wilbur, & Bieber, 1962) take a firm position that treatment is warranted, whereas others state that, on philosophical and moral grounds, they have determined that it is inappropriate to even attempt treatment of such problems (Davison, 1976). The author tends to take a middle-of-the-road approach. If an individual approaches me with a request to attempt to change his or her behavior in one of these areas, the request is honored and a treatment strategy is developed that, if it is acceptable to the patient, is carried out. However, if the patient does not wish to attempt to change the behavior and is not harming others, no effort is made to change the behavior. This places the responsibility and decision making in the hands of the patient, with the therapist serving as consultant and assistant.

One important consideration with respect to treatment of these disorders has to do with the efficacy of treatment. None of the approaches that have been employed enjoy any more than a very modest success rate. Success rates in the 30–40% range are common. Outcomes of 50% or better are unusual and considered exceptionally good. It is probable that the lower success rate is due to the fact that the behavior engaged in is one that is inherently reinforcing. Thus, the problem is not simply one of retraining the person in a different behavior but also of interrupting an ongoing reinforcement contingency. The dual therapeutic task of interrupting an ongoing reinforcement contingency and developing a new behavior to be reinforced is fraught with considerable difficulty and does not lead to as much success as situations such as anxiety or phobia reduction where there is very little if any positive reinforcement for the ongoing behavior and any change in behavior is a welcome relief.

Strategy of Therapy

The general strategy to employ in treating sexual variations is under dispute. A commonsense approach suggests that some effort should be made to inhibit the sexually variant behavior with the idea that more "normal" behavior can be learned and developed following this process. However, many therapists argue that it is more efficient and effective first to expand the patient's repertoire of behavior by enabling him or her to learn more appropriate sexual behaviors. Once more appropriate and effective behaviors are learned, the inappropriate behaviors might spontaneously cease or can be treated with aversion therapy. It is reasoned that it is easier for a person with a sexual problem to expand his or her repertoire of sexual behavior than to inhibit the only outlet that he or she knows. Thus, for example, in treating a homosexual an effort would be made to expand the repertoire to a point where he or she is bisexual and capable of responding to males and females. Following this, some effort might be made to reduce or control the homosexual behavior if the patient desires. Although it would be desirable to make a choice between the strategies on the basis of data, sufficient data are not available to make this possible.

Treatment Techniques

Aversive Conditioning

Examination of the literature indicates that behavioral methods have been used for a wide variety of sexual variations including voyeurism, exhibitionism, transvestism, fetishism, sadism, masochism, homosexuality, pedophilia, and hebephilia. The most common element in the treatment programs described in the literature is some form of aversive conditioning. A variety of paradigms have been used involving such things as punishment, escape or avoidance learning, aversion–relief, covert sensitization, and mixtures of these. Aversive stimuli employed have most commonly involved electrical shock, chemically induced nausea, vomiting, and imagined aversive scenes (Fensterheim, 1974). Bancroft (1970) employed a punishment paradigm in which homosexual patients were given brief electric shock contingent on penile response to slides of male stimuli or in response to arousal from homosexual fantasies.

A more common procedure involves aversion–relief. In another study by Bancroft (1969), 10 homosexual males were treated with electric shock that was made contingent on penile response to homosexual fantasies and slides. Female slides were interspersed with the male slides, and shock was never experienced in response to the female slides. Nude male slides were associated with onset of shock, and female slides were associated with cessation of shock, or relief. An avoidance paradigm is best illustrated by the work of Feldman and MacCulloch (1971), who employed aversive conditioning techniques in treating homosexuality in males. Feldman and MacCulloch reported 60% success with a series of 43 patients after an average of 18–20 sessions of 20–25 minutes. Other investigators (Bancroft, 1969; McConaghy, 1975; McConaghy & Barr, 1973) have reported much more modest success with similar methods.

Chemical aversion is illustrated in a study by Morgenstern, Pearce, and Rees (1965) in which 13 transvestites were given apomorphine to induce nausea and vomiting. While in a sickened state they cross-dressed. The treatment sessions occurred 3 times per day for 13 days, a total of 39 sessions. Follow-up ranging from 8 months to 4 years indicated that 7 of the 13 no longer cross-dressed and the other 6 did so less frequently.

Another example of the use of chemicals is provided in a case study of a pedophiliac reported by Levin, Barry, Ganbara, Wolfinsohn, and Smith (1977) in which they successfully treated the patient using covert sensitization assisted by aversive olfactory stimulation by means of inhaling valeric acid.

Davison (1968) has provided a classical description of covert aversive techniques with a college student who was involved in sadistic fantasies and who could be sexually aroused only by sadistic fantasies of torturing

women. The first step in treatment was to increase his heterosexual arousal through "orgasmic training" in which he first used his sadistic fantasies to attain an erection and then, in a systematic way, deliberately switched to heterosexual content while continuing to masturbate. This method increased his heterosexual interests and activities, but the sadistic fantasies remained. These fantasies were then treated with covert sensitization. The aversive image worked out with the patient was "a large bowl of steaming urine with reeking fecal boli floating on top." He imagined drinking this "soup" while going through his sadistic fantasies. The image was so vivid that the became nauseous. He later reported that he was no longer able to obtain an erection to the sadistic fantasies, though he was having pleasant orgasms through masturbation with normal fantasies. Six months later, he made a deliberate decision to revive the sadistic fantasies. For the next 9 months these fantasies were present, although heterosexual interests and activities remained high. Then the patient himself reinstituted the covert sensitization and once again was freed of the sadism.

Cautela and Wisocki (1971) have described, and illustrated with case materials, the use of covert sensitization procedures with homosexuals. Anant (1968) presented a case study in which covert sensitization procedures were used to reduce promiscuity in a retarded female. Another covert procedure that has been attempted is thought stopping. This has been used with some success to reduce the thoughts leading to inappropriate sexual behavior (Fensterheim, 1974).

Provoked Anxiety

Jones and Frei (1977) treated 15 exhibitionists with a behavioral method that involved provoked anxiety. The procedure involved having the patient undress completely in front of a mixed audience. While undressed, he described episodes in which he had exposed his genitals; and a videotape was made that was played back to him later. The results revealed complete cessation of exhibitionism in 10 patients, and the rest showed a marked reduction in frequency.

Boredom

In a fascinating study, Marshall and Lippens (1977) described treatment of a fetishist by means of boredom. The patient was required to masturbate to orgasm in the presence of the fetish stimulus (pantyhose) and to visualize deviant fantasies while engaged in masturbation. The patient was instructed to continue this procedure beyond the point of orgasm for the duration of the session, which lasted 1½ hours. By the end of each session, the excitation had disappeared, and a mild aversion in the form of boredom developed.

Biofeedback

One further study worth mentioning in this context is the case study of Rosen and Kopel (1977), who treated a 45-year-old transvestite–exhibitionist using penile plethysmography and biofeedback. The patient viewed heterosexual and transvestite–exhibitionist films but was instructed to inhibit arousal and attempt to avoid erection. If he failed to do this according to the criterion set for that session, an aversive noise was delivered to him through earphones. By the end of 12 treatment sessions, the patient's response to the transvestite–exhibitionist film was eliminated. Follow-up reports from the patient indicated that he was no longer engaging in cross-dressing or exhibitionism. However, while the article was in press, the authors were contacted by the client's wife and told that, in fact, her husband had resumed cross-dressing and exposure some time following the initial therapy program and had recently been arrested again. She stated that she and her husband had been deceiving the investigators for over a year. They stated that they did not want to disappoint the therapist and did not want to risk further consequences, such as loss of job, by accurately reporting. This article points out the importance of meticulous follow-up and dangers of using self-report for the follow-up.

The problems of the above study aside, there is some evidence that biofeedback involving penile plethysmography can be useful in treating sexually variant behavior (Keltner, 1977; Rosen, 1976; Rosen & Kopel, 1977).

Anxiety Reduction and Social Skills Training

Numerous reports have appeared in which systematic desensitization (Huff, 1970; LoPiccolo, 1971), assertion training (Ellis, 1959; Salter, 1961; Stevenson & Wolpe, 1960), and social skills training techniques (Cautela & Wisocki, 1969; Hersen & Eisler, 1976) have been used to enhance heterosexual behavior and sexually appropriate role behavior as a part of the treatment of individuals who have adopted variant sexual behavior. For example, Wolpe (1958) observed that anxiety in other areas can sometimes result in the appearance of sexually variant behavior. He reported on a voyeur who had considerable interpersonal anxiety. When these anxieties were desensitized, the voyeuristic behavior ceased. This, of course, agrees with the common notion that one reason for adopting sexual variant behavior is that one is unsuccessful or inept in the competitive market for heterosexual behavior. However, these techniques appear to have only minimal effectiveness unless included as one component in a program involving other techniques.

Positive Conditioning

Several attempts have been made to treat sexual variant behavior by means of positive reconditioning. Such techniques are warranted in that

heterosexual behavior does not necessarily occur without training (Brownell, Hayes, & Barlow, 1977). As Money (1972) has pointed out, "heterosexuality is not a positive force that rushes in to fill an erotic vacuum" (p. 79). The literature related to homosexuality has been carefully reviewed by Adams and Sturgis (1977). Of course, many therapists from a number of theoretical backgrounds have attempted to insure that their homosexual patients would have satisfying relationships with members of the opposite sex as a part of therapy. However, some behavioral methods have been employed to better prepare the patient to be able to respond to such contacts. Masturbation using films or pictures from magazines or fantasies of the opposite sex have been employed frequently (e.g., LoPiccolo, Stewart, & Watkins, 1972; Marquis, 1970). Freeman and Meyer (1975) reported an interesting approach in which homosexual slides, which aroused the patient sexually, were paired in a classical conditioning paradigm with heterosexual slides. They successfully conditioned sexual arousal to the heterosexual slides by this means. They then followed with electrical shock to inhibit arousal to the homosexual slides. Barlow and Agras (1973) attempted to increase heterosexual responsiveness by using two slide projectors in such a way that heterosexual and homosexual slides were projected on a screen in a superimposed manner. As arousal began to occur, the intensity of the light for the homosexual stimulus was lessened, resulting in that stimulus fading and leaving the heterosexual stimulus present. In yet another experiment Herman, Barlow, and Agras (1974) exposed homosexual patients to relatively large doses of explicit heterosexual pornographic stimuli in an attempt to induce sexual arousal. All four subjects in this experiment did show increased frequency of arousal to heterosexual stimuli. Finally, Bebbington (1977), in his treatment of male sexual variant behavior, has reported on the use of a vibrator as the unconditioned stimulus in producing responses to heterosexual stimuli in a classical conditioning paradigm.

In their review, Adams and Sturgis (1977) indicated that at present only modest results have been reported for the attempts to modify homosexual behavior either by inducing positive sexual responses to heterosexual stimuli or by reducing homosexual responsivity. However, it does appear that these methods offer some promise and should be investigated further. They also note that it may well be that a multicomponent treatment program will prove more effective than any of the single approaches. Thus, it might be possible to develop a standard package (or a way of determining which components should be included for an individualized package for a given patient) that will result in modification of heterosexual and homosexual behavior in the desired directions. In this vein, Barlow (1974) has suggested that there are at least four components of sexual functioning—heterosexual arousal, heterosexual skills, deviant arousal, and gender role deviation—that must be considered in formulating a case and determining treatment strategy.

Rape Offenders and Victims

The problem of rape constitutes an interesting facet of sexual dysfunction. Many clinicians have argued that rape is not a sexual act (e.g., Groth & Burgess, 1977) but rather is an act of aggression, hostility, or dominance. However, as Gebhard, Gagnon, Pomeroy, and Christenson (1965) have pointed out, there are several categories of rape offenders, some of which are definitely sexual in nature. Much research has been done recently on the circumstances and nature of rape (Abel, Barlow, Blanchard, & Guild, 1977; Albin, 1977; Groth & Burgess, 1977), and numerous articles have appeared dealing with treatment of the victim (Brodsky, 1976; Guest, 1977; Hicks & Platt, 1976). Although some work in the area of treatment for the offender has been done (Abel, Blanchard, & Becker, 1978), more is needed (Groth, Burgess, & Holmstrom, 1977). Neither DSM II nor DSM III (American Psychiatric Association 1968, 1978) mentions the rapist as a category.

Sexual Abuse of Children

Before closing this section, some comment should be made regarding sexual abuse of children. Recent evidence suggests that this has been a greatly underreported occurrence in the past (Giarretto, 1976; Gligor, 1967; Kaufman, Peck, & Tagiuri, 1954; Weiner, 1964). Sensitivity to the area of child abuse has resulted in the discovery of many instances of sexual abuse of children. Although there are few reliable data available in this area, the effects of such abuse appear to vary along several dimensions, including age of the child, length of time and frequency of the abuse, whether the adult abuser was a stranger or someone known to the child, and whether or not force was used (Gligor, 1967; Meiselman, 1978). Some suggestions have been made regarding treatment for children and their families following sexual abuse (Giarretto, 1976; Harbert, Hersen, Barlow, & Austin, 1974; Meiselman, 1978). The author has found systematic desensitization, relaxation training, and assertion training helpful for the child victim. Family behavioral contracting and sexual therapy for the offender have also proven helpful.

SEXUAL DISORDERS OF CHILDREN

Organic Conditions

Although there is a relative dearth of research literature in the area of sexual problems of children, children treated in clinical settings frequently present with sexual difficulties. There are several genetic and organic conditions that result in sexual difficulty for children. Chief

among these are sexual ambiguity of the genitalia and precocious or delayed puberty. In these cases, the psychologist often needs to be a patient advocate to be sure that adequate medical consultation and care is afforded the patient. Beyond that, the unique psychological and educational problems posed by the condition should be addressed. In the case of sexual ambiguity, provision should be made for sex education and supportive counseling for the child as he or she develops. Money (1968, 1974) has written extensively on this topic and has concluded from a careful review of the literature in the area that the psychological rearing of the child, rather than the chromosomal genotype, determines the gender identity as an adult.

In the case of precocious puberty, it is often necessary to reassure parents that the fact that the child has become sexually mature at an age much younger than his or her peers does not signal that the child will become sexually promiscuous or deviant as a result (Money, 1968). In fact, the literature (Money & Ehrhardt, 1972) indicates that these young people are relatively conservative with respect to their peers in sexual matters and show generally good judgment. Likewise, with those who are delayed in achieving puberty, the adult sexual adjustment does not appear to be compromised by this, provided they are given some reassurance and proper education. The parents of children with these difficulties often need more reassurance and education than do the children, though assistance is needed with both.

Gender Identity Confusion

Gender identity confusion is not uncommonly observed in children. In its broadest sense, this category refers to children who are developing in directions that can involve homosexuality, transvestism, or transsexualism. Development of adequate skills in sex role functioning and behaviors is a difficult and stressful experience for all young people. Behavioral intervention has been found to be useful in reducing the stress and enabling the young person to develop appropriate behaviors. Most clinicians and researchers involved in this area stress the importance of early identification of the problem (Green, 1971; Newman, 1970) and the use of a variety of techniques, often relying heavily on modeling and positive conditioning experiences (Bentler, 1968c; McGuire et al., 1965; Rekers & Varni, 1977) to enable the child to develop in normal and appropriate ways.

Barlow and his associates have reported the only successful treatment (behavioral or otherwise) of transsexuals (Barlow, Reynolds, & Agras, 1973; Barlow, Abel, & Blanchard, 1979). Generally, by the time transsexual orientation is fully developed, psychotherapeutic efforts are of no avail. Surgical alteration of the genitalia appears to offer what help there is, and it is not always successful.

Precocious Sexual Interest

It is not uncommon for children to be referred for treatment of precocious interest in sexual behavior. For example, we have treated several children who seemed to be unusually preoccupied with sexual matters. These included two 5-year-old males who were accused of sexually molesting other children in the neighborhood and a 4-year-old girl who had been inducing young boys in the foster home in which she had been placed to perform oral sex on her. Generally, children involved in these kinds of activities have been in a home situation where they have either frequently observed sexual behaviors or, in some cases, have actually been involved in sexual behavior with the adults in the home. The most important consideration in these cases is environmental manipulation to see that the factors in the environment that have been producing the behavior are eliminated. The adults responsible for them might then need to be reassured that these behaviors do not have the same connotations or significance for children as they do for adults and that they are much more innocent in their pursuit of the behaviors. Discouraging the behaviors, along with encouraging more appropriate behaviors, is helpful.

Masturbatory Problems

Another common problem that is frequently reported with children involves masturbatory activity. Complaints in this area generally fall into three categories. First are complaints from parents or child care workers who observe young children masturbating and feel that this is reprehensible and inappropriate. Second are children who are compulsive masturbators. Third are those who masturbate publicly; many times these are children in institutions, particularly in institutions for the mentally retarded. In dealing with these problems, it is often necessary to discuss with the parents or workers the fact that exploration and manipulation of the genitals is normal behavior for all children. Bakwin (1973) and others have pointed out that both males and females under the age of 1 year have been observed to masturbate to orgasm. Throughout the years before puberty, most children explore themselves and manipulate their genitals, often to orgasm. From puberty on, masturbation is a very common occurrence for males and females and is not to be regarded as abnormal. Often, reassurances regarding the normality of this behavior and pointing out the fact that such activity does not result in children becoming sexually promiscuous in later years or somehow damaging themselves physically is all that is needed. One common myth in this area is that the genitals are only capable of a certain number of orgasms in a lifetime. Thus, some people fear that masturbation can literally wear children out so that later in life they will be unresponsive or impotent.

In a very interesting review of the changing attitudes of professionals about sexual behavior over the last 100 years, LoPiccolo and Heiman

(1977) point out that in the late 1800s most professionals thought that masturbation caused physical harm and even death in some cases. A number of devices were on the market to prevent children from masturbation, such as metal mittens, an alarm that rang in the parents' bedroom if the child's bed was moving, and a wide variety of straps and garments. In addition, surgical mutilation and searing of the genitals with hot irons was sometimes practiced by physicians. Although most professionals and lay people today would state that they believe masturbation to be normal, myths die slowly and people's attitudes and behaviors are often discrepant with their statements.

Compulsive masturbation presents somewhat more of a problem. Discussion regarding the normality of masturbation and the fact that it does not signal more deviant or extreme behavior in later life is important. However, the compulsive nature of the behavior must be dealt with. There have been cases reported in which children masturbated to the point where the genitals were left raw and bleeding (Levine, 1951). Compulsive masturbating in younger children generally occurs on the same principle as does thumb sucking. That is, the child learns that this is a pleasurable activity that reduces tension and makes one the center of considerable attention from adults. Thus, the activity serves a number of purposes and is heavily reinforced in the child's life. The author has occasionally explained to parents the similarity between compulsive masturbation and compulsive thumb sucking, only to have them respond that although the principle involved might be the same, the behavior is considerably different when it occurs in the presence of guests or relatives. Generally, compulsive masturbation can be dealt with by tension reduction therapy, conflict resolution therapy in the home, mild discouragement of the behavior, and reinforcement for not engaging in the behavior. The habit reversal methods of Azrin and Nunn (1973) can also be adapted to this problem. The child can be taught to squeeze the tip of a piece of clothing, such as the tip of their shirt or skirt or something of that sort, rather than manipulating the genitals. With this type of therapy, the compulsive masturbation can generally be eliminated in a relatively short period of time. An interesting, but as yet unexplained, observation is the high incidence of compulsive masturbation in girls as compared to boys (Bakwin, 1973; McCray, 1978). Whether this reflects a real difference in incidence or a double standard in what is considered acceptable for boys and girls is not clear.

Public masturbation has been handled by a number of behavioral techniques. For example, Olson and Kelley (1969) reported on the use of electric shock in the treatment of a 23-year-old patient who engaged in public masturbation. However, most therapists would be reluctant to use this method with younger children. Janzen and Peacock (1978) have reported on the use of general behavior management principles and contracting in eliminating public masturbation. Likewise, Cook, Altman, Shaw, and Blaylock (1978) reported on a case in which public masturba-

tion was eliminated by using lemon juice as a mildly aversive stimulus. The basic procedure was to inject a drop or two of lemon juice into the mouth of the child each time he manipulated his genitals in public.

It is important in all of the above treatments to be aware that the basic issue is to deal with the inappropriate expression of a normal behavior rather than attempt to completely eliminate the behavior. Thus, discrimination training is needed to enable the child to understand that masturbation in private is considerably different from public masturbation.

Fetishes

Development of fetishes is common in children. Shaw and Walker (1979) have reported on the treatment of a mildly retarded male who, by the age of 9 years, had developed a strong foot fetish. In church he was observed to crawl around under the pews fondling people's feet and manipulating his genitals. Some demands were being made that he be put in an institution as he was beginning to be regarded as dangerous. Treatment of this child involved teaching him relaxation procedures as a self-control technique to inhibit inappropriate sexual arousal. Following intensive training in relaxation, the patient was taught to associate this with the cue word, "relax." He was then put through an *in vivo* desensitization program in which female staff members approached him and spent varying amounts of time talking and playing games with him with their feet covered and uncovered. If he began to show excessive interest in the feet, he was reminded to relax, inhibit the arousal, and pay attention to the activity in progress. The behavior was eliminated in a couple of weeks and has not returned in approximately 2 years of follow-up. Similar procedures were used, this time including biofeedback training as part of the relaxation procedures, with a teenager who had developed a fetish for women's underclothing. The client was first exposed to relaxation training involving feedback and then desensitized with actual garments until he was able to be in the presence of these garments and handle them without becoming aroused. He was then instructed to use this as a self-control technique when tempted to engage in the fetish behavior.

SUMMARY

Treatment of sexual dysfunctions has made significant advances with the development of behavioral methods of therapy and assessment. Several methods of assessment, including interview procedures, assessment instruments, questionnaires, and checklists, are available for evaluating the specific sources of dysfunction and providing guidelines for the type of therapy that each case requires.

Female sexual dysfunction encompasses two main categories: dys-

pareunia (painful intercourse) and orgasmic dysfunction. Treatment of dyspareunia includes relaxation therapy, sexual reeducation, sensate focus, and various forms of *in vivo* as well as imagined systematic desensitization. In addition to these techniques, orgasmic dysfunction can be treated by marital enrichment, hypnosis, masturbation, vaginal exercise, positive conditioning, and self-management principles.

Major sexual dysfunctions in the male include lack of sexual drive, erectile failure, premature ejaculation, retarded ejaculation, and ejaculatory incompetence. Relaxation training, systematic desensitization, positive reconditioning, exercises, biofeedback, and mechanotherapy have been employed therapeutically.

A relatively new area is the counseling and treatment of sexual dysfunctions in groups with special handicaps. The elderly, the chronically disabled, the patient with spinal cord injury, the cardiac patient, and the patient with sexual anomalies all require specific counseling and treatment relative to their disorders.

Although there are important questions raised about the advisability of treating sexual variations, especially homosexuality, treatment strategies include aversive therapy, aversion–relief therapy, penile plethysmography, biofeedback, covert sensitization, and positive reconditioning.

Sexual problems of children include a wide variety of difficulties such as ambiguity of genitalia, precocious puberty, delayed puberty, masturbatory activity, fetishism, and sexual abuse. In most instances, treatment consists of proper sex education and supportive counseling, with importance placed on teaching appropriate sexual behaviors.

REFERENCES

Abel, G. G., Barlow, D. H., Blanchard, E. B., & Guild, D. The components of rapists' sexual arousal. *Archives of General Psychiatry*, 1977, *34*, 895–903.

Abel, G. G., Blanchard, E. B., & Becker, J. V. In R. T. Rada (Ed.), *Clinical aspects of the rapist.* New York: Grune & Stratton, 1978.

Adams, H. E., & Sturgis, E. T. Status of behavioral reorientation techniques in the modification of homosexuality: A review. *Psychological Bulletin*, 1977, *84*(6), 1171–1188.

Albin, R. S. Review essay: Psychological studies of rape. *Signs: Journal of Women in Culture and Society*, 1977, *3*(2), 423–435.

American Psychiatric Association. *Diagnostic and statistical manual of mental disorders* (2nd ed.). Washington, D.C.: Author, 1968.

American Psychiatric Association. *DSM-III: Diagnostic criteria draft.* Washington, D.C.: Author, 1978.

Anant, S. S. Verbal aversion therapy with a promiscuous girl: Case report. *Psychological Reports*, 1968, *22*, 795–796.

Annon, J. J. *The behavioral treatment of sexual problems* (Vol. 1). Honolulu: Kapiolani Health Services, 1974.

Asirdas, S., & Beech, H. R. The behavioural treatment of sexual inadequacy. *Journal of Psychosomatic Research*, 1975, *19*, 345–353.

Azrin, N. H., & Nunn, R. G. Habit reversal: A method of eliminating nervous habits and tics. *Behaviour Research and Therapy,* 1973, *11,* 619–628.

Bakwin, H. Erotic feelings in infants and young children. *American Journal of the Diseases of Children,* 1973, *126*(1), 52–54.

Bancroft, J. Aversion therapy of homosexuality. *British Journal of Psychiatry,* 1969, *115,* 1417–1431.

Bancroft, J. A comparative study of aversion and desensitization in the treatment of homosexuality. In L. E. Burns & J. H. Worsley (Eds.), *Behaviour Therapy in the 1970's.* Bristol: Wright, 1970.

Barbach, L. G. Group treatment of preorgasmic women. *Journal of Sex and Marital Therapy,* 1974, *1*(2), 139–145.

Barlow, D. H. The treatment of sexual deviation: Towards a comprehensive behavioral approach. In K. S. Calhoun, H. E. Adams, & K. M. Mitchell (Eds.), *Innovative treatment methods in psychopathology.* New York: Wiley, 1974.

Barlow, D. H. Assessment of sexual behavior. In A. R. Ciminero, K. S. Calhoun, & H. E. Adams (Eds.), *Handbook of behavioral assessment.* New York: Wiley, 1977.

Barlow, D. H., & Agras, W. S. Fading to increase heterosexual responsiveness in homosexuals. *Journal of Applied Behavioral Analysis,* 1973, *6,* 355–366.

Barlow, D. H., Reynolds, E. H., & Agras, W. S. Gender identity change in a transsexual. *Archives of General Psychiatry,* 1973, *28,* 569–579.

Barlow, D. H., Abel, M. D., & Blanchard, E. B. *Archives of General Psychiatry,* 1979, *36,* 1001–1007.

Bebbington, P. E. Treatment of male sexual deviation by use of a vibrator: Case report. *Archives of Sexual Behavior,* 1977, *6*(1), 21–24.

Beech, H. R., Watts, F., & Poole, A. D. Classical conditioning of a sexual deviation: A preliminary note. *Behavior Therapy,* 1971, *2,* 400–402.

Beheri, G. E. Surgical treatment for impotence. *Plastic Reconstructive Surgery,* 1966, *38,* 92–97.

Bentler, P. M. Heterosexual behavior assessment—I: Males. *Behaviour Research and Therapy,* 1968, *6,* 21–25. (a)

Bentler, P. M. Heterosexual behavior assessment—II: Females. *Behaviour Research and Therapy,* 1968, *6,* 27–30. (b)

Bentler, P. M. A note on the treatment of adolescent sex problems. *Journal of Child Psychology and Psychiatry and Allied Disciplines,* 1968, *9*(2), 125–129. (c)

Bieber, I., Dain, H. J., Dince, P. R., Drellich, M. G., Grand, H. G., Gundlach, R. H., Kremer, M. W., Rifkin, A. H., Wilbur, C. G., & Bieber, T. B. *Homosexuality: A psychoanalytic study.* New York: Random House, 1962.

Brodsky, C. M. Rape at work. In M. J. Walker & S. L. Brodsky (Eds.), *Sexual assault.* Lexington, Mass.: D. C. Heath, 1976.

Brownell, K. D., Hayes, S. C., & Barlow, D. H. Patterns of appropriate and deviant sexual arousal: The behavioral treatment of multiple sexual deviations. *Journal of Consulting and Clinical Psychology,* 1977, *45*(6), 1144–1155.

Burnham, W. R., Leonard-Jones, J. E., & Brooke, B. N. Sexual problems among married ileostomists. *Gut,* 1977, *18,* 673–677.

Cautela, J. R., & Wisocki, P. A. The use of male and female therapists in the treatment of homosexual behavior. In R. Rubin & C. Franks (Eds.), *Advances in behavior therapy.* New York: Academic Press, 1969.

Cautela, J. R., & Wisocki, P. A. Covert sensitization for the treatment of sexual deviations. *Psychological Record,* 1971, *21,* 37–48.

Comarr, A. E., & Vigue, M. Sexual counseling among male and female patients with spinal cord and/or cauda equina injury. *American Journal of Physical Medicine,* 1978, *57*(3), 107–122.

Comfort, A. (Ed.). *The joy of sex.* New York: Crown Publishers, 1972.

Comfort, A. (Ed.). *More joy.* New York: Crown Publishers, 1974.

Cook, J. W., Altman, K., Shaw, J., & Blaylock, M. Use of contingent lemon juice to eliminate

public masturbation by a severely retarded boy. *Behaviour Research and Therapy*, 1978, *16*, 131–134.

Cooper, A. J. A blind evaluation of a penile ring—a sex aid for impotent males. *British Journal of Psychiatry*, 1974, *124*, 402–406.

Csillag, E. R. Modification of penile erectile response. *Behavior Therapy and Experimental Psychiatry*, 1976, *7*, 27–29.

Davison, G. C. Elimination of a sadistic fantasy by a client-controlled counterconditioning technique: A case study. *Journal of Abnormal and Social Psychology*, 1968, *73*, 84.

Davison, G. C. Homosexuality: The ethical challenge. *Journal of Consulting and Clinical Psychology*, 1976, *44*(2), 157–162.

Dengrove, E. The mechanotherapy of sexual disorders. *The Journal of Sex Research*, 1971, *7*(1), 1–12.

Elgosin, R. B. Premarital counseling and sexual adjustment in marriage. *Connecticut State Medical Journal*, 1951, *15*, 999–1002.

Ellis, A. A. A homosexual treated with rational psychotherapy. *Journal of Clinical Psychology*, 1959, *15*, 338–343.

Fabbri, R. *The use of guided phantasy in sexual therapy: Behaviorists' kit*. New Haven, Conn.: Behavioral and Educational Consulting Corporation, 1977.

Feldman, M. P., & MacCulloch, M. J. *Homosexual behavior: Therapy and assessment*. New York: Pergamon, 1971.

Fensterheim, H. Behavior therapy of the sexual variations. *Journal of Sex and Marital Therapy*, 1974, *1*(1), 16–28.

Fensterheim, H., & Baer, J. *Don't say yes when you want to say no*. New York: McKay, 1975.

Freman, W., & Meyer, R. G. A behavioral alteration of sexual preferences in the human male. *Behavior Therapy*, 1975, *6*, 206–212.

Gebhard, P. H., Gagnon, J. H., Pomeroy, W. B., & Christenson, C. V. *Sex offenders: An analysis of types*. New York: Harper & Row, 1965.

Giaretto, H. Humanistic treatment of father-daughter incest. In R. E. Helfer & C. H. Kempe (Eds.), *Child abuse and neglect*. Cambridge, Mass.: Ballinger Books, 1976.

Gligor, A. M. *Incest and sexual delinquency: A comparison of two forms of sexual behavior in minor females*. Unpublished doctoral dissertation, Case Western Reserve University, 1967.

Goldfried, M. R., & Linehan, M. M. Basic issues in behavioral assessment. In A. R. Ciminero, K. S. Calhoun, & H. E. Adams (Eds.), *Handbook of behavioral assessment*. New York: Wiley, 1977.

Green, R. Diagnosis and treatment of gender identity disorders during childhood. *Archives of Sexual Behavior*, 1971, *1*(2), 167–173.

Green, R. (Ed.). *Human sexuality: A health practitioner's text*. Baltimore: Williams & Wilkins, 1975.

Griffith, E. R., Timms, R. J., & Tomko, M. A. *Sexual problems of patients with spinal injuries: An annotated bibliography*. Cincinnati: University of Cincinnati College of Medicine, 1973.

Groth, N. A., & Burgess, A. W. Rape: A sexual deviation. *American Journal of Orthopsychiatry*, 1977, *47*(3), 400–406.

Groth, N. A., Burgess, A. W., & Holmstrom, L. L. Rape: Power, anger, and sexuality. *American Journal of Psychiatry*, 1977, *134*(11), 1239–1243.

Group for the Advancement of Psychiatry. *Assessment of sexual function: A guide to interviewing* (GAP Report No. 88). New York: GAP, 1973.

Guest, F. *To comfort and relieve them: Counseling rape victims*. Atlanta: Reproductive Health Resources, 1977.

Hall, S. Vaginismus as cause of dyspareunia: Report of cases and method of treatment. *Western Journal of Surgery, Obstetrics, and Gynecology*, 1952, *60*, 117–120.

Harbert, T., Hersen, M., Barlow, D., & Austin, J. Measurement and modification of incestuous behavior: A case study. *Psychological Reports*, 1974, *34*, 79–86.

Hartman, W. E., & Fithian, M. A. *Treatment of sexual dysfunction: A bio-psychosocial approach.* Long Beach, Calif.: Center for Marital and Sexual Studies, 1972.

Herman, S. H., & Prewett, M. An experimental analysis of feedback to increase sexual arousal in a case of homo- and heterosexual impotence: A preliminary report. *Journal of Behavior Therapy and Experimental Psychiatry*, 1974, 5, 271–274.

Herman, S. H. Barlow, D. H., & Agras, W. S. An experimental analysis of exposure to "explicit" heterosexual stimuli as an effective variable in changing arousal patterns of homosexuals. *Behavior Research and Therapy*, 1974, 12, 335–345.

Hersen, M., & Eisler, R. M. Social skills training. In W. E. Craighead, A. E. Kazdin, & M. J. Mahoney (Eds.), *Behavior modification: Principles, issues, and applications.* Boston: Houghton Mifflin, 1976.

Hicks, D. J., & Platt, C. R. Medical treatment for the victim: The development of a rape treatment center. In M. J. Walker & S. L. Brodsky (Eds.), *Sexual assault.* Lexington, Mass.: D. C. Heath, 1976.

Holland, C. J. An interview guide for behavioral counseling with parents. *Behavior Therapy*, 1970, 1(1), 70–79.

Hoon, P. W., Wincze, J. P., & Hoon, E. F. Physiological assessment of sexual arousal in women. *Psychophysiology*, 1976, 13(3), 196–204.

Horgan, J. H., & Craig, A. J. Resumption of sexual activity after myocardial infarction. *Irish Medical Journal*, 1978, 71(16), 540–542.

Huff, F. The desensitization of a homosexual. *Behaviour Research and Therapy*, 1970, 8, 99–102.

Human sexuality. New York: Wiley, 1973. (Film)

Jacobson, N. S. Problem solving and contingency contracting in the treatment of marital discord. *Journal of Consulting and Clinical Psychology*, 1977, 45(1), 92–100.

Jankovich, R., & Miller, P. R. Response of women with primary orgasmic dysfunction to audio visual education. *Journal of Sex and Marital Therapy*, 1978, 4(1), 16–19.

Janzen, W. B., & Peacock, R. Treatment of public masturbation by behavioral management. *American Journal of Psychotherapy*, 1978, 32, 300–306.

Johnston, B. L., Cantwell, J. D., Watt, E. W., & Fletcher, G. F. Sexual activity in exercising patients after myocardial infarction and revascularization. *Heart and Lung*, 1978, 7(6), 1026–1031.

Jones, I. H., & Frei, D. Provoked anxiety as a treatment of exhibitionism. *British Journal of Psychiatry*, 1977, 131, 295–300.

Kanfer, F. H., & Grimm, L. G. Behavioral analysis: Selecting target behaviors in the interview. *Behavior Modification*, 1977, 1, 7–28.

Kanfer, F. H., & Saslow, G. Behavioral analysis: An alternative to diagnostic classification. *Archives of General Psychiatry*, 1965, 12, 529–538.

Kaplan, H. S. The classification of the female sexual dysfunction. *Journal of Sex and Marital Therapy*, 1974, 1(2), 124–138. (a)

Kaplan, H. S. *The new sex therapy.* New York: Bruner/Mazel, 1974. (b)

Kass, D. J., & Stauss, F. F. *Sex therapy at home.* New York: Simon & Schuster, 1975.

Kaufman, I., Peck, A., & Tagiuri, C. The family constellation and overt incestuous relations between father and daughter. *American Journal of Orthopsychiatry*, 1954, 24, 266–279.

Kegel, A. Sexual functions of the pubococcygeus muscle. *Journal of Obstetrics and Gynecology*, 1952, 60, 521–524.

Keltner, A. A. The control of penile tumescence with biofeedback in two cases of pedophilia. *Corrective and Social Psychiatry and Journal of Behavior Technology, Methods and Therapy*, 1977, 23(4), 117–121.

Kinsey, A. C., Pomeroy, W. B., & Martin, C. E. *Sexual behavior in the human male.* Philadelphia: W. B. Saunders, 1948.

Kinsey, A. C., Pomeroy, W. B., Martin, C. E., & Gebhard, P. H. *Sexual behavior in the human female.* Philadelphia: W. B. Saunders, 1953.

Kiresuk, T., & Sherman, R. Goal attainment scaling: A general method for evaluating

comprehensive community mental health programs. *Community Mental Health Journal*, 1968, *4*, 443–453.

Knox, D. *Marriage happiness: A behavioral approach to counseling.* Champaign, Ill.: Research Press, 1971.

Kohlenberg, R. Directed masturbation and the treatment of primary orgasmic dysfunction. *Archives of Sexual Behavior*, 1974, *3*, 349–356.

Kothari, D. R., Timm, G. W., Frohrib, D. A., & Bradley, W. E. An implantable fluid transfer system for treatment of impotence. *Journal of Biomechanics*, 1972, *5*, 567–570.

Lash, H. Silicone implant for impotence. *Journal of Urology*, 1968, *100*, 709–710.

Laughren, T. P., & Kass, D. J. Desensitization of sexual dysfunction: The present status. In A. S. Gurman & D. G. Rice (Eds.), *Couples in conflict.* New York: Jason Aronson, 1975.

Laws, D. R., & Pawlowski, A. V. A multipurpose biofeedback device for penile plethysmography. *Journal of Behavior Therapy and Experimental Psychology*, 1973, *4*, 339–341.

Leckie, F. Hypnotherapy in gynecological disorders. *International Journal of Clinical and Experimental Hypnosis*, 1964, *12*, 121–146.

Levin, S. M., Barry, S. M., Ganbara, S., Wolfinsohn, L., & Smith, A. Variations of covert sensitization in the treatment of pedophilic behavior: A case study. *Journal of Consulting and Clinical Psychology*, 1977, *45*(5), 896–907.

Levine, M. I. Pediatric observations of masturbation in children. *Psychoanalytic Study of the Child*, 1951 6, 117–124.

Levit, H. Marital crisis intervention: Hypnosis in impotence/frigidity cases. *American Journal of Clinical Hypnosis*, 1971, *14*, 56–60.

Lief, H. I., & Reed, D. M. *Sex knowledge and attitude test.* Philadelphia: Center for the Study of Sex Education in Medicine, 1971.

Locke, H. J., & Wallace, K. M. Short marital adjustment and prediction tests: Their reliability and validity. *Marriage and Family Living*, 1959, *21*, 251–255.

Loeffler, R. A., & Sayegh, E. S. Perforated acrylic implants in management of organic impotence. *Journal of Urology*, 1960, *84*, 559–561.

Loeffler, R. A., Sayegh, E. S., & Lash, H. The artificial os penis. *Plastic Reconstructive Surgery*, 1964, *34*, 71–74.

LoPiccolo, J. Case study. Systematic desensitization of homosexuality. *Behavior Therapy*, 1971, *2*, 394–399.

LoPiccolo, J. *Scoring and interpretation manual for the Oregon Sex Inventory.* Unpublished manuscript, University of Oregon, 1972.

LoPiccolo, J., & Heiman, J. C-ltural values and the therapeutic definition of sexual function and dysfunction. *Journal of Social Issues*, 1977, *33*(2), 166–183.

LoPiccolo, J., & Lobitz, W. C. The role of masturbation in the treatment of orgasmic dysfunction. *Archives of Sexual Behavior*, 1972, *2*(2), 163–171.

LoPiccolo, J., Stewart, R., & Watkins, B. Treatment of erectile failure and ejaculatory incompetence of homosexual etiology. *Journal of Behavior Therapy and Experimental Psychiatry*, 1972, *3*, 233–236.

Management of sexual dysfunction. Glendale, Calif.: Audio-Digest Foundation, 1978.

Margolin, G., & Weiss, R. L. Communication training and assessment: A case of behavioral marital enrichment. *Behavior Therapy*, 1978, *9*, 508–520.

Marquis, J. N. Orgasmic reconditioning: Changing sexual choice through controlling masturbatory fantasies. *Journal of Behavior Therapy and Experimental Psychiatry*, 1970, *1*, 263–271.

Marshall, W. L., & Lippens, K. The clinical value of boredom. *The Journal of Nervous and Mental Disease*, 1977, *165*(4), 283–287.

Martin, J. D. Note on a mathematical "theory" of coital frequency in marriage. *Journal of Sex Research*, 1970, *6*(4), 326–331.

Masters, W. H., & Johnson, V. E. *Human sexual response.* Boston: Little, Brown, 1966.

Masters, W. H., & Johnson, V. E. *Human sexual inadequacy.* Boston: Little, Brown, 1970.

Masters, W. H., & Johnson, V. E. *The pleasure bond.* Boston: Little, Brown, 1975.

Masters, W. H., & Johnson, V. E. *Homosexuality in perspective.* Boston: Little, Brown, 1979.

McCarthy, B. W. Strategies and techniques for the reduction of sexual anxiety. *Journal of Sex and Marital Therapy,* 1977, *3*(4), 243–248.

McCary, J. L. *Human sexuality: Physiological, psychological, and sociological factors:* New York: D. Van Nostrand, 1973.

McCary, J. L., & Flake, M. H. The role of bibliotherapy and sex education in counseling for sexual problems. *Professional Psychology,* 1971, *2*(4), 353–357.

McConaghy, N. Aversive and positive conditioning treatments of homosexuality. *Behaviour Research and Therapy,* 1975, *13,* 309–319.

McConaghy, N., & Barr, R. F. Classical, avoidance and backward conditioning treatments of homosexuality. *British Journal of Psychiatry,* 1973, *122,* 151–162.

McCray, G. M. Excessive masturbation of childhood: A symptom of tactile deprivation. *Pediatrics,* 1978, *62*(3), 277–279.

McGuire, R. J., Carlisle, J. M., & Young, B. G. Sexual deviations as conditioned behavior: A hypothesis. *Behaviour Research and Therapy,* 1965, *2,* 185–190.

Meiselman, K. *Incest: A psychological study of causes and effects with treatment recommendations.* San Francisco: Jossey-Bass, 1978.

Miller, P. R. *Human sexuality: It's anatomy, physiology, and psychology.* Baltimore: Williams & Wilkins, 1974. (Film)

Mirowitz, J. The utilization of hypnosis in psychic impotence. *British Journal of Medical Hypnotism,* 1966, *17,* 25–32.

Money, J. *Sex errors of the body.* Baltimore: The John Hopkins University Press, 1968.

Money, J. Strategy, ethics, behavior modification, and homosexuality. *Archives of Sexual Behavior,* 1972, *2,* 79–82.

Money, J. Intersexual and transexual behavior and syndromes. In S. Arieti (Ed.), *American handbook of psychiatry* (Vol. 3). New York: Basic Books, 1974.

Money, J., & Ehrhardt, A. A. *Man and woman/boy and girl.* Baltimore: The John Hopkins University Press, 1972.

Morgenstern, F., Pearce, J., & Rees, W. L. Predicting the outcome of behavior therapy by psychological tests. *Behaviour Research and Therapy,* 1965, *2,* 191–200.

Mosher, D. L. The meaning and measurement of guilt. In C. E. Izard (Ed.), *Emotions in personality and psychopathology.* New York: Plenum Press, 1979.

Multi-media resource center book list. San Francisco: Multi-Media Resource Center, 1979.

Munjack, D. I., & Oziel, L. J. Resistance in the behavioral treatment of sexual dysfunctions. *Journal of Sex and Marital Therapy,* 1978, *4*(2), 122–138.

Newman, L. E. Transsexualism in adolescence. *Archives of General Psychiatry,* 1970, *23,* 112–121.

Olson, K. A., & Kelley, W. R. Reduction of compulsive masturbation by electrical-aversive conditioning to verbal cues: A case report. *Canadian Psychiatric Association Journal,* 1969, *14,* 303–305.

Pearman, R. O. Treatment of organic impotence by implantation of a penile prosthesis. *Journal of Urology,* 1967, *97,* 716–719.

Perry, J. D., & Whipple, B. Pelvic muscle strength of female ejaculators: Evidence in support of a new theory of orgasm. *Journal of Sex Research,* 1981, *17*(1), 22–39.

Rachman, S. Sexual fetishism: An experimental analogue. *Psychological Record,* 1966, *16,* 293–295.

Rekers, G. A., & Varni, J. W. Self-monitoring and self-reinforcement processes in a pre-transsexual boy. *Behaviour Research and Therapy,* 1977, *15,* 177–180.

Renshaw, D. C. Sex and the cardiac patient. *Comprehensive Therapy,* 1978, *4*(11), 13–17.

Richardson, T. Hypnotherapy in firgidity. *American Journal of Clinical Hypnosis,* 1963, *5,* 194–199.

Rosen, R. C. Genital blood flow measurement: Feedback applications in sexual therapy. *Journal of Sex and Marital Therapy,* 1976, *2*(3), 184–196.

Rosen, R. C., & Kopel, S. A. Penile plethysmography and biofeedback in the treatment of a transvestite-exhibitionist. *Journal of Consulting and Clinical Psychology,* 1977, *45*(5), 908–916.

Rosenberg, J. L. *Total orgasm.* New York: Random House, 1973.

Rowland, K. F., & Haynes, S. N. A sexual enhancement program for elderly couples. *Journal of Sex and Marital Therapy,* 1978, *4*(2), 91–113.

Salter, A. *Conditioned reflex therapy.* New York: Capricorn Books, 1961.

Scalzi, C., & Dracup, L. Sexual counseling of coronary patients. *Heart and Lung,* 1978, *7*(5), 840–845.

Scott, F. B., Byrd, G. J., Karacan, I., Olsson, P., Beutler, L. E., & Attia, S. L. Erectile impotence treated with an implantable, inflatable prosthesis. *Journal of the American Medical Association,* 1979, *241*(24), 2609–2612.

Segel, H. Psychotherapy vs. hypnotherapy in the treatment of sex problems. *American Journal of Clinical Hypnosis,* 1970, *13*, 128–130.

Semans, J. H. Premature ejaculation: A new approach. *Southern Medical Journal,* 1956, *49*, 353–357.

Sexual compatibility: The sensual cycle of life. New Haven, Conn: Behavioral and Educational Consulting Corporation, 1978. (Slides)

Sexual counseling. Englewood, N.J.: EDCOA Productions, 1976. (Film)

Shaw, W., & Walker, C. E. Relaxation treatment of foot fetish in an eight-year-old boy with phenylketonuria. *Journal of Pediatric Psychology,* 1979, *4*, 403–407.

Shusterman, L. R. The treatment of impotence by behavior modification techniques: A review. *Journal of Sex Research,* 1973, *9*(3), 226–240.

Sidman, J. M. Sexual functioning and the physically disabled adult. *American Journal of Occupational Therapy,* 1977, *31*, 81–85.

Sotile, W. M., & Kilmann, P. R. Effects of systematic desensitization on female orgasmic dysfunction. *Archives of Sexual behavior,* 1978, *7*(5), 477–491.

Sotile, W. M., Kilmann, P., & Follingsted, D. R. A sexual enhancement workshop: Beyond group systematic desensitization for women's sexual anxiety. *Journal of Sex and Marital Therapy,* 1977, *3*(4), 249–255.

Steger, J. *The assessment of sexual function and dysfunction.* Paper presented at the annual meeting of the Western Psychological Association, Portland, Ore., 1972.

Stevenson, I., & Wolpe, J. Recovery from sexual deviation through overcoming nonsexual neurotic responses. *American Journal of Psychiatry,* 1960, *116*, 789.

Thorne, F. C. *The sex inventory.* Brandon, Vt.: Clinical Psychology Publishing, 1965.

Treatment of sexual dysfunction. Long Beach, Calif.: Center for Marital and Sexual Studies, 1972. (Film)

Tuthill, J. F. Impotence. *Lancet,* 1955, *268*, 124–128.

Vemireddi, N. K. Sexual counseling for chronically disabled patients. *Geriatrics,* 1978, *33*, 65–69.

Wagner, J. S. (Ed.). *Cosmopolitan's love book.* New York: Cosmopolitan Books, 1972.

Wallace, D. H., & Barbach, L. G. Preorgasmic group treatment. *Journal of Sex and Marital Therapy,* 1974, *1*(2), 146–154.

Weiner, I. B. On incest: A survey. *Excerpta Criminologia,* 1964, *4*, 137–155.

Wishnoff, R. The application of self-management principles to the treatment of sexual dysfunctions. *Journal of Sex and Marital Therapy,* 1977, *3*(3), 212–219.

Wishnoff, R. Modeling effects of explicit and nonexplicit sexual stimuli on the sexual anxiety and behavior of women. *Archives of Sexual Behavior,* 1978, *7*(5), 455–461.

Wolpe, J. *Psychotherapy by reciprocal inhibition.* Stanford, Calif.: Stanford University Press, 1958.

Zeiss, A. M., Rosen, G. M., & Zeiss, R. A. Orgasm during intercourse: A treatment strategy for women. *Journal of Consulting and Clinical Psychology,* 1977, *45*(5), 891–895.

Zeiss, R. A., Christensen, A., & Levine, A. G. Treatment for premature ejaculation through male-only groups. *Journal of Sex and Marital Therapy,* 1978. *4*(2), 139–143.

Zuckerman, M. Physiological measures of sexual arousal in the human. *Psychological Bulletin*, 1971, 75(5), 297–329.
Zuckerman, M. Scales for sex experience for males and females. *Journal of Consulting and Clinical Psychology*, 1973, *41*(1), 27–29.

Movement Disorders

Samuel M. Turner and Randall L. Morrison

INTRODUCTION

Movement disorders refer to a class of behaviors involving the neuromuscular system and consisting of involuntary muscular movements. Such movements can involve specific muscular units, as is the case with blepharospasm (involuntary eye blinks), groups of muscles (e.g., spasmodic torticollis), or multiple muscular units and groups (e.g., Gilles de la Tourette's syndrome). The etiology of such conditions has long been the center of much controversy. This controversy has been primarily concerned with neurological versus psychological causation. Actually, the term *movement disorder* is relatively new with respect to widespread usage and incorporates disorders that do in fact have a physical basis (e.g., multiple sclerosis) as well as disorders caused by the use of drugs in the treatment of psychotic disturbances (e.g., tardive dyskinesia). With the emergence of biological psychiatry in the past few years (Guze, 1977) and the renewed interest in the relationship of brain chemistry to mental function, there has been increasing research and theoretical speculation on neurological involvement in what heretofore had been primarily considered psychogenic conditions. It is not our purpose here to review biological theories of movement disorders or to argue for a specific interpretation of etiology. Such theorizing at this point would appear to be premature inasmuch as some disorders seem to have biological causes in

SAMUEL M. TURNER • Department of Psychiatry, Western Psychiatric Institute and Clinic, University of Pittsburgh School of Medicine, Pittsburgh, Pennsylvania 15260. RANDALL L. MORRISON • Department of Psychology, University of Pittsburgh, Pittsburgh, Pennsylvania 15260.

some instances and psychological causes in others. Moreover, it seems feasible to us that such disorders are the result of both biological and psychological factors combined. As stated previously, there are some strictly medical conditions (e.g., Parkinson's disease) that also have significant psychological ramifications.

In this chapter we will be concerned with that group of disorders typically referred to as psychogenic tics. We will not consider disorders that have established pathophysiological bases. However, it should be acknowledged that some degree of control over movement disorders that have biological involvement can be attained through the use of behavioral intervention strategies (Mostofsky, 1981). Specifically, we will briefly review the major behavioral theories of psychogenic tics, describe the clinical picture of the disorders presented, discuss behavioral approaches to treatment, and, when data are available, discuss medical approaches to treatment.

BEHAVIORAL THEORY AND TREATMENT OF TICS

Early discussions regarding the treatment of tics are often cited as precursors to current behavior therapy techniques. Perhaps the first of these was a report by Gilby (1825) on the successful application of a procedure resembling current strategies of electrical aversive conditioning in the treatment of spasmodic torticollis. An early approximation of massed practice as a method for the treatment of spasmodic torticollis was provided by Poore (1873). Possibly the best known precedent to the current use of behavioral interventions in the treatment of tics is the work by Meige and Feindel (1907). They conceptualized tics as examples of learned habits and advocated the use of a reeducative approach with regard to treatment. Twenty-five years later, Dunlap (1932) discussed the etiology of undesirable habits in general and claimed that repeated practice of unwanted negative habits (e.g., tics) would eventually result in their elimination.

Despite these behavioral precedents, the literature relating to tics prior to the 1950s was almost exclusively based on psychoanalytic theory, and primarily consisted of case histories and theorization concerning the nature of tics (Yates, 1970). It has only been since Yates's (1958) attempt to validate experimentally a behavioral, or learning theory–based, intervention for movement disorders that interest and knowledge regarding the treatment of tics has significantly increased.

Behavioral Theories of Tics

Behavioral theorists, like their biological counterparts, have been slow to develop specific theories of tic disorders. Actually, Yates's (1958)

discussion and the use of operant theory represent the extent of specific behavioral theorizing.

Yates's Theory

Using Hullian learning theory, Yates (1958) proposed a theory where the tic was conceptualized as a drive-reducing conditioned avoidance response, originally instituted as the result of a traumatic experience. According to Yates, when an individual is subject to intense fear arousal and escape is impossible, the only alternative may be a truncated movement or withdrawal of aggression. If the movement is somehow associated with the cessation of fear, it will acquire reinforcing properties. Subsequently, the movement might be elicited in other anxiety-arousing situations. The process of stimulus generalization is invoked to account for the transfer. Hence, the movement can develop into a response that accompanies any high-anxiety situation. Although Yates did not generate data to directly support his model, he pointed out that animal studies on conditioned avoidance responses (CAR) conducted by Solomon and Wynne (1954) provided support. Solomon and Wynne showed that rats placed in a traumatic situation developed CARs that appeared to reduce anxiety and that were highly resistant to extinction. The model also closely followed the two-factor theory of learning proposed by Mowrer (1960) that incorporated both classical and instrumental conditioning. The treatment technique proposed by Yates for elimination of such behaviors (negative or massed practice), will be discussed in relation to specific tic disorders.

Operant Theories

Although there is no specific operant theory of tics, basic operant theory is easily extrapolated to tic disorders. Essentially, tic movements are seen as being generated and maintained by their consequences. Operant treatments of tics will be discussed under specific disorders.

Behavioral Treatments

In the following sections, we will review the literature pertaining to the behavioral treatment of specific syndromes. In that these disorders involve readily observable responses, they represent optimal targets for behavioral intervention. However, their low prevalence has made group outcome studies difficult, if not impossible. The literature pertaining to the behavioral treatment of movement disorders consists exclusively of clinical and experimental single-case studies. These will be reviewed in an attempt to evaluate the efficacy of the various behavioral techniques that have been applied.

GILLES DE LA TOURETTE'S SYNDROME

Gilles de la Tourette's syndrome is easily the most exotic of the tic disorders. It is named after the Frenchman Gilles de la Tourette, who first described the syndrome in an 1885 paper. The disorder consists of multiple motor tics and forced verbalizations that are frequently of a coprolalic nature and frequently obscenities.

The condition is much more prevalent in males than females (approximately 3 to 1), and the onset is typically between the ages of 5 and 8 (Shapiro, Shapiro, Bruun, & Sweet, 1978). The tics appear to serve no specific purpose and are distinct from other motor movements in their stereotyped patterns. In addition, patients are able to control the movements for brief periods of time. The tics typically begin in the upper parts of the body (face, head, neck) and spread to the limbs and trunk. The disorder becomes progressively worse and includes blinking, grimacing, jerking of the head, shrugging of the shoulders, or jerking of the arms and legs. On occasion, entire body movements can be involved, leading to jumping, skipping, or hopping.

Verbal tics frequently begin with barely audible sounds or grunts that progress in many instances to clearly distinguishable words of an obscene nature. The motor and verbal tics tend to be affected by anxiety, anger, or other emotional stress. Much has been written on the clinical picture, etiology, and treatment (Fernando, 1967; Kelman, 1965; Shapiro *et al.*, 1978).

A variety of behavioral interventions have been employed in the treatment of the complex pattern of symptoms presenting in Tourette's syndrome. Several recent clinical and experimental reports have discussed the use of self-monitoring either alone or in combination with other treatment techniques. The first reported use of self-monitoring in the treatment of Tourette's syndrome was a case study by Thomas, Abrams, and Johnson (1971). The subject was an 18-year-old male who suffered from tics of the neck and hands and emitted barklike noises. Tics of the face and mouth were first observed at age 5, with an onset of the barking noises at age 11. Previous psychotherapeutic interventions had been unsuccessful, although the administration of haloperidol had resulted in some limited improvement. The subject evidenced normal electroencephalogram (EEG) recordings. Fifteen-minute periods of unobtrusive observations of the subject's tic behaviors in hospital and community settings were conducted prior to and throughout treatment. Self-monitoring of the vocal tic resulted in a marked and rapid reduction in its frequency across settings, from a pretreatment rate of 4.5 tics per minute to zero tics per minute two days later. Subsequently, the subject began to emit different, less intense vocal sounds. These new sounds, and the neck tic, were also successfully treated using self-monitoring. However, confounding this subsequent self-monitoring phase was the implementation of imaginal systematic desensitization to hospital and community set-

tings in which high pretreatment rates of tic behavior had been observed. Furthermore, the subject had been maintained on haloperidol (4.5 mg/day) throughout the course of the behavioral treatment. An additional shortcoming of these findings is that no follow-up data were presented.

Hutzell, Platzek, and Logue (1974) employed self-monitoring using a single-case experimental design in the treatment of an 11-year-old male with symptoms of Tourette's syndrome. Six months prior to treatment, the subject had developed a skipping motion while walking, a head jerk, and barking noises. Prior to the self-monitoring intervention, haloperidol had been administered. No further information regarding the medical regimen was reported. The medication had resulted in only a variable and short-term effect, with no definite symptom remission. Self-monitoring was evaluated in a multiple-baseline design across the head jerk and barking behaviors. Observations of head jerks and barks were made during therapy sessions by a trained observer. The subject self-monitored tic behaviors during six 5-minute periods throughout each therapy session. Accurate self-monitoring was verbally reinforced by the therapist. In order to obtain information regarding the generalization of treatment effects, the subject's mother was instructed regarding the observation and recording of the tic behaviors. Results indicated that the self-monitoring procedure was effective in controlling the tic. Symptoms were decreased both in the therapeutic setting and in the natural environment. Although at posttreatment the average rate during self-monitoring periods had only decreased to 1.03 tics per minute from a pretreatment rate of 1.20 tics per minute, at a 1-year follow-up, one head jerk occurred during the six 5-minute periods of self-monitoring. The self-monitoring treatment also demonstrated greater control over barking behavior. The frequency of barks decreased from a baseline rate of 1.58 barks per minute to a mean of 0.21 barks per minute during self-monitoring periods. At both a 1.5-month and a 1-year follow-up, barks were emitted at a rate of less than one per minute. Perhaps more importantly, reports from the subject's parents and teachers indicated that tic behavior rates had decreased to zero in the natural environment.

Self-monitoring was only partially effective in the treatment of symptoms of Tourette's syndrome in a case study reported by Savicki and Carlin (1972). The subject was a 17-year-old male who had first developed an eye blink tic at age 9. Vocalizations and barking noises began at age 15. Previous administration of unspecified tranquilizers had been unsuccessful. A neurological examination conducted prior to treatment also had been negative. Self-monitoring of the deviant noises emitted by the subject resulted in an initial decline in their frequency. Noises decreased from an average of approximately 48 per day to a rate of approximately 28 per day. As this was not considered a clinically acceptable reduction in vocalizations, negative practice and relaxation training were then introduced to supplement the self-monitoring procedure. In addition, a contingency management program resembling time-out was initiated. If the

subject made noises at home, he was to leave the room and practice relaxation for 3 minutes. However, it should be emphasized that at the conclusion of the self-monitoring phase, the frequency of the vocal tic was still decreasing. Therefore, the reduction in tic behavior obtained using the self-monitoring procedure alone might not represent an adequate evaluation of its efficacy. The combination of negative practice, relaxation training, time-out, and self-monitoring led to an 85% reduction in noisemaking (as indicated by self-monitoring data). However, a 10-week follow-up revealed a marked deterioration in the subject's behavior.

The application of self-monitoring to the treatment of Tourette's syndrome has produced equivocal findings. In all three instances, self-monitoring appears to have been at least partially effective. However, due to shortcomings in the methodologies employed, no firm conclusions or recommendations can be made regarding its overall utility at this time. Although self-monitoring does appear to hold some promise, additional single-case experimental evaluations should be conducted in order to clearly determine its usefulness.

Massed practice, either alone or in combination with various other techniques, has been used in a number of attempts to treat Tourette's syndrome. Clark (1966) used massed practice in the treatment of three cases of the syndrome. The first subject was a 22-year-old male with head and arm tics and coprolalia. Motoric symptoms first appeared at age 10, when the subject evidenced neck-twisting behavior. Subsequently, grunting and then swearing developed. Most available drugs had been tried in treatment with no success. The second subject was a 17-year-old male. He had first evidenced a leg jerk, with subsequent development of facial tics, barking, and occasional obscenities. As with the first subject, numerous drug regimens had been unsuccessful in ameliorating the symptoms. The third subject was a 47-year-old woman, who emitted explosive, sometimes obscene verbalizations and what was described by the author as a "complex muscular spasm of several years duration" (p. 772). Although little information was provided regarding the course of the disorder in the third subject, both tic behaviors were apparently of only several years duration. Thus, her symptomatology was atypical in this regard in comparison to the usual course of Tourette's syndrome. Treatment in all three cases involved massed practice of the verbal tic. Although the third subject dropped out of treatment after 10 sessions, treatment was successful in the first two cases. Follow-up was obtained over a 4-year period by interview and letter. However, the only empirical data reported were in regard to rate of voluntary responding during massed practice sessions. No objective information regarding rate of involuntary tic behavior was presented.

Nicassio, Liberman, Patterson, Ramirez, and Sanders (1972) employed a multiple-baseline procedure across an ABA design in the treatment of a 33-year-old male using massed practice. The subject's symp-

tomatology was apparently that of Tourette's syndrome, although he was not diagnosed as such. He had displayed various tics since age 7. Immediately prior to treatment he evidenced a neck jerk, eye blink, shoulder jerk, and noises. Numerous treatments had been previously attempted including unspecified chemotherapy. The results of a neurological examination were within normal limits. When practice for the neck tic began, spontaneous neck tic frequency during three 15-minute observation periods a day decreased almost 48%. However, the control tics, eyeblink and noise, decreased by better than 5% and 61%, respectively. As an explanation for these results, Nicassio *et al.* posited that an extraneous variable might have intervened and resulted in the simultaneous reduction in all three tics. However, a more likely explanation is that the behaviors comprising Tourette's syndrome are not independent. Consequently, changes in the frequency of certain of the behaviors would also affect the frequency of others.

Furthermore, there was some question as to the stability of the tic behaviors across the baseline period. The rates of both noises and neck tics appeared to decline during the initial baseline. These were the two behaviors to evidence the greatest reduction in frequency during the first treatment phase, when massed practice was introduced for the neck tics. As discussed earlier, the tic behaviors that comprise Tourette's syndrome are often cyclical in occurrence. The findings of the study by Nicassio *et al.* might thus be representative merely of the fluctuation in tic frequency that typifies the disorder. Greater care should be exercised in future studies to ensure that stable baseline rates of responding have been attained before treatment is initiated. These issues notwithstanding, both tic behaviors that were ultimately treated by Nicassio *et al.* using massed practice (neck and eye tics) had a higher frequency of occurrence at a 3-month follow-up than prior to treatment. This latter finding further suggests the inadequacy of massed practice treatment for the disorder.

The findings of several other studies suggest that massed practice can have a detrimental effect on the treatment of symptoms of Tourette's syndrome. Feldman and Werry (1966) used massed practice in an attempt to treat a 15-year-old boy with multiple tics of the face, neck, and head. The tics had first appeared at age 7. At age 11, grunting had appeared, but it disappeared several months prior to the beginning of treatment. Although not diagnosed as Tourette's syndrome by the authors, the subject's symptomatology appears to suggest such a diagnosis. Again, the apparent "disappearance" of the grunting might simply have been a manifestation of the cyclical nature of the tic behavior comprising the syndrome. Previous treatment attempts had included dynamically oriented psychotherapy and phenothiazines. Using massed practice, Feldman and Werry treated the head jerk tic, leaving the eye blink untreated as a control. Results indicated that both practiced and unpracticed tics increased as a linear function of the number of massed practice sessions (again suggesting the interdependence of the behaviors comprising

Tourette's syndrome). These increases occurred both in the therapy set-
ting (as recorded by the therapist) and at home. In addition, the subject
also developed a throat noise. Treatment was terminated, and the fre-
quency of tics subsequently fell to pretreatment levels (no information
was reported regarding the means by which data on the frequency of tic
behaviors at home were recorded).

In a recent case study (Hollandsworth & Bausinger, 1978), massed
practice had a detrimental effect on the treatment of an 18-year-old
female diagnosed as having Tourette's syndrome. Coprolalia and motor
tics had been present since age 5. The subject had been prescribed mel-
laril at age 11 but unilaterally stopped taking the medication at age 14,
when she dropped out of school. At age 17, she was prescribed
haloperidol, but after 10 months, even on high doses, she was still emit-
ting coprolalic responses at a rate of more than 200 times per day. Because
massed practice increased the frequency and improved the articulation of
the coprolalic responses (as measured by trained observers during periods
of general conversation and by self-report data), it was terminated after
only eight sessions. The authors discussed the subject's coprolalic re-
sponses as operant behavior that enabled her to avoid school and com-
mand the attention and sympathy of others. Although this interpretation
is speculative, it is quite possible that such behavior functions as an
operant at least some of the time. When treating such disorders, there-
fore, the therapist should be cognizant of the potential operant aspects of
the behavior.

Massed practice was successfully used in combination with control
of the social contingencies associated with tic behavior in the treatment
of a 13-year-old boy with Tourette's syndrome (Tophoff, 1973). The sub-
ject's symptoms first appeared at age 10. Previous pharmacological and
psychotherapeutic interventions had been unsuccessful and no dysfunc-
tion had been revealed in a neurological examination. Following a
baseline period of self-monitoring and observations of tic behavior at
school and by the subject's family, massed practice was initiated. Treat-
ment was focused on the verbal tics, as they occurred most frequently.
During the treatment phase, it was observed that the subject's parents
would almost invariably attend to him contingent on tic behavior. This
attention took the form of either punishment or attempts to "talk him
out of the tic" (p. 72). At this point, the parents were instructed to ignore
tic behavior. Fourteen sessions of massed practice resulted in elimination
of the motor symptoms as well as the verbal tic. Treatment gains were
maintained at a 4-month follow-up. However, despite the apparent clini-
cal improvement, the lack of methodological rigor with which the study
was conducted precludes the indentification of the active components of
treatment.

A later study by Lahey, McNees, and McNees (1973) isolated the
effects of massed practice and control of social contingencies in the
treatment of coprolalia in a 10-year-old male child in an EMR classroom.

In addition to the coprolalia, the subject suffered from a stutter, eye blinks, and a head jerk. All procedures were conducted by the subject's teacher. Following baseline recordings of coprolalic behavior in the classroom, a massed practice procedure was introduced. This resulted in an immediate drop in the frequency of the coprolalic responding, but not to an acceptable level (from a rate of two per minute to a rate of one per minute). Subsequently, a time-out procedure was introduced in which the child was removed from the classroom whenever he emitted a coprolalic response. The time-out procedure resulted in a further reduction of the coprolalic behavior. Also, the amplitude and articulation of the coprolalic responding decreased to the point that the obscenity was rarely intelligible. At this point, a return to baseline conditions resulted in an immediate and marked deterioration of the coprolalic behavior. Following this second baseline period, the time-out procedure was reintroduced and again demonstrated effective control over the coprolalia. However, no follow-up data were reported. Thus, the findings indicate that control of the contingencies associated with tic behavior was more effective in the treatment of these particular behaviors than was massed practice, at least temporarily.

The data from these studies suggest, then, that massed practice is not effective in the treatment of Tourette's syndrome. Although the evidence from certain of the investigations is inconclusive due to a lack of methodological rigor, in several instances massed practice appears to have exacerbated the symptoms. Lahey *et al.* (1973) obtained some reduction in tic behavior using massed practice, but clinically acceptable levels of responding were not achieved. Moreover, it is not clear whether or not this was a case of Tourette's. Given these data, it would appear that future efforts to treat Tourette's syndrome should emphasize methods that might have a greater potential for success. Among these, control of the external contingencies associated with tic behavior has shown particular promise. Miller (1970) used a similar time-out procedure to that used by Lahey *et al.* (1973) in the treatment of a 5-year-old boy who had first developed barking noises at age 3 and subsequently experienced numerous other tics including eye blinking, facial grimaces, head jerking, neck twisting, and writhing. The subject did not exhibit coprolalia. No organic basis for the disorder could be determined. A time-out contingency was instituted in the home for barks and motoric tics. Additionally, the subject received praise from his parents for tic-free days. The procedures effectively controlled the barking and motoric tic behaviors in the home, although barking noises increased in school. A similar time-out and token reinforcement procedure was implemented in the classroom. These procedures were effective in reducing the child's barking behavior. At an 18-month follow-up, the subject was almost symptom free, needing only occasional reminders to refrain from emitting tic behaviors.

Doleys and Kurtz (1974) used token reinforcers in the treatment of a 14-year-old boy with a 5-year history of tics including coprolalia and

guttural sounds, jerking of his upper extremities, and a general lack of social skills. During treatment sessions with a special-education teacher, the subject wore earphones through which music was programmed to occur on a DRO (differential reinforcement of other behavior) schedule of reinforcement. Token reinforcers were presented concurrently with the music. Reinforcement was contingent on eye contact, conversation, and 15-second intervals of non–tic behavior, and noise was presented contingent on tic behaviors. In order to ensure generalization of appropriate behavior, the contingency was extended to more naturalistic settings. These procedures were effective in reducing the frequency of tics and increasing the rate of appropriate behaviors in and out of the treatment setting. However, no follow-up data were reported.

The operant nature of the symptoms associated with Tourette's syndrome was further demonstrated in a case study of a 12-year-old boy reported by Rosen and Wesner (1973). Symptoms included bizarre twirling, obscene gesturing with finger and tongue, and repeated verbalization of obscenities. The youth was in a residential institution and was maintained on haloperidol throughout the study. An EEG obtained prior to the study indicated no neurological dysfunction. During baseline observations of the child's classroom behavior, an increase in tic behaviors occurred when the subject knew he was being observed in comparison to his behavior during surreptitious observations. Individual treatment sessions were conducted in which the subject received candy for tic-free periods. During these sessions, verbal praise was provided contingent on tongue gestures. The purpose of this procedure, as explained by Rosen and Wesner, was to substitute tongue movements for the vocal response, because they would be less maladaptive. Both vocal and gross motor behaviors decreased using this procedure, and tongue movement first increased, then decreased. During the third session, the subject was taught a relaxation procedure. Contingencies were subsequently introduced into the classroom. The entire class was reinforced with candy for tic-free intervals. Ultimately, the child was weaned from the candy reinforcers to teacher praise. Although the tic behaviors were effectively reduced in the classroom setting, there was no generalization to the residence unit, where tic behaviors remained problematic. No follow-up data were presented.

Generalization was obtained by Cohen and Marks (1977), who reported an operant conditioning program that was administered at home by the parents of an 11-year-old boy to control his barklike vocal tics. Following a period of baseline observation by the parents, a reward system consisting of stars and money for gradually lengthened tic-free periods was implemented. The program was successful in eliminating vocal tic behavior and, after 6 weeks, was discontinued. However, a 6-month follow-up indicated that motor tics, which had persisted throughout the study, remained. The nature of these tics was not reported. However, the authors indicate that treatment did generalize to

the classroom setting, where "control of the patient's tics improved" (p. 315), although no data regarding the extent of the improvement were reported.

Self-monitoring was used in association with external reinforcement and time-out procedures in a recent single-subject experimental study by Varni, Boyd, and Cataldo (1978). A combination of single-subject reversal and multiple-baseline designs across treatment settings and tic behaviors was used in the treatment of high-rate tic behaviors. The subject was a 7-year-old male who, although diagnosed as minimal brain dysfunction–hyperactive, had a 5-year history of multiple tic behaviors resembling the symptomatology seen in Tourette's syndrome. These tics included facial grimaces, a shoulder shrug, rump protrusion, and a vocal tic. The subject initially was taught to self-monitor facial tics during treatment sessions. After he had learned to accurately self-monitor, contingencies for facial tics were introduced. For each 5-minute interval in which the subject emitted fewer than 10 facial tics (as recorded by the therapist), he was allowed access to free time. More than 10 facial tics resulted in his being placed in a barren room for 5 minutes (time-out). The child was observed in the clinic once a week for an average of three observation sessions. The number of permissible tics during each of these 5-minute observation intervals was gradually reduced to zero by the 23rd session. Results indicated that treatment of the facial tic generalized to the other three tic behaviors. All tics had been reduced to zero occurrence and remained at that level at a 32-week follow-up. There was some generalization across settings. As treatment began at the clinic, home baseline recordings by the child's mother indicated a decline in the frequency of all four tic behaviors. Two weeks after treatment was begun at the clinic, a combination token reinforcement and time-out treatment procedure, contingent on facial tics, was implemented in the home. During the 10th week of home treatment, similar contingencies were also imposed on vocal tic behavior. As in the clinic, facial and vocal tics decreased to zero when the contingencies were sequentially applied with a concomitant decrease (also to zero occurrence) in the untreated behaviors. At the 32-week follow-up, all four tics remained at zero occurrence in the home.

Finally, a combination of the three behavioral techniques that have been discussed so far was unsuccessfully employed by Sand and Carlson (1973) in an attempt to treat a 9-year-old male with Tourette's syndrome. The subject had exhibited an eye blink and facial tics since kindergarten. Tics of the face, neck, shoulders, and throat were noted by his parents at age 7. Treatment with unspecified tranquilizers had been attempted but had not been successful. Coprolalia and clucking sounds were present when the child was seen for treatment. A neurological examination and EEG were negative. Baseline frequencies of tic behaviors were initially recorded during six interviews with the child over a 3-week period. Following baseline, a change in the contingencies associated with the tic behaviors was implemented. Prior to treatment, the subject was frequently dismissed

from school whenever his sounds became especially loud or frequent. At home, his parents would become more attentive to him when his tics increased in loudness or frequency. With the change in the contingencies, school officials were instructed not to dismiss the subject, and his parents were instructed to ignore tic behavior and spend extra time with their son when he had been especially quiet. After the change in contingencies had been in effect for 6 weeks, both the subject and his parents were given wrist counters and instructed to count the frequency of vocal tics. Finally, during the fourth month of treatment, massed practice was initiated. Each of the treatment strategies resulted in a reduction in tic frequency and topography. Of the three, massed practice had the greatest effect. However, although the behavioral techniques led to "significant" changes in both the topography of tics and frequency of tics "none of the behavior therapies used decreased tics to socially acceptable levels" (p. 670). Because the subject's family was soon to be moving away from the area, the administration of haloperidol (0.25 mg four times per day) was added to the treatment regimen. The medication resulted in a documented and prolonged reduction in frequency of tic behavior. Although the behavioral techniques did not result in clinically acceptable reductions in tic behavior in this study, it should be noted that stabilization of responding had not been achieved in any of the behavioral treatment phases. That is, tic frequency was generally decreasing across all treatment phases. It is possible, then, as noted by the authors, that any of the behavioral treatment strategies might have demonstrated considerably greater treatment effects had treatment phases been extended. However, the most important finding in this study was that haloperidol exerted strong positive control over the tic behavior for a long duration of time.

The literature regarding the application of behavioral interventions to the treatment of Tourette's syndrome is complicated by a number of methodological issues. It is especially unfortunate that treatment outcome investigations of a disorder of such low prevalence have been conducted without adequate methodological rigor. Future investigations should be carefully controlled so as to maximize the confidence that can be placed in the findings. Perhaps the most frequent methodological shortcoming is the failure to provide adequate follow-up data. Of the 15 studies that we have reviewed, only 5 provided follow-up data for periods of at least 6 months after the termination of treatment. A second weakness of many of the studies is the failure to obtain data to attest to the generalization of treatment effects. More often than not, treatment effects are only assessed in the laboratory setting. Third, the improvements that might have resulted from treatment, though statistically significant, do not necessarily represent adequate clinical improvement. Relating to this issue, the data are sometimes reported in ways that seem to obscure the specific change in responding that was obtained. For example, as

indicated previously, Clark (1966) only reported empirical data regarding rate of voluntary responding during massed practice. No empirical data regarding rate of involuntary tic behaviors are presented. An additional concern relates to the accuracy of the data that are reported. Self-report data, or the reports of untrained observers such as parents or teachers, are sometimes obtained with little or no consideration of the reliability of the observations (e.g., Lahey *et al.*, 1973; Savicki & Carlin, 1972). Although in many instances the behavior to be recorded is especially salient and "easy" to observe, it is not justifiable to assume that reliable data are being obtained. Furthermore, given that treatment outcome research is concerned with the consideration of the relative efficacy of treatment strategies (Kazdin & Wilson, 1978), greater detail should be provided regarding previous interventions that have been attempted. For example, prior medication regimens are often only casually described (e.g., Savicki & Carlin, 1972). Similarly, greater care should be taken to accurately detail each subject's symptomatology. It might be that different intervention strategies can be differentially effective with different symptom patterns. However, given only minimal information regarding symptomatology (e.g., Clark, 1966), it is not possible to derive any such conclusions. A final methodological issue is that many of the treatment studies employ uncontrolled designs. Thus, the results are suspect.

These issues notwithstanding, a number of conclusions are suggested by the literature. Massed practice holds relatively little promise as an effective treatment strategy for the treatment of Tourette's syndrome. The treatment that has quite clearly been most effective has been control of the contingencies associated with tic behavior. In all cases, such contingency management paradigms met with at least a modicum of success (although in a number of cases these successes were obtained in uncontrolled studies). Further evaluation is needed to determine the relative effectiveness of self-monitoring as an intervention strategy. Perhaps self-monitoring would be an effective procedure to be used in conjunction with contingency management programs as suggested by Varni *et al.* (1978). However, given the presumably involuntary nature of the behaviors that comprise Tourette's syndrome, it seems unlikely that self-monitoring alone would prove effective. Comprehensive treatment packages must be developed that take into consideration the subjects' adaptive abilities, including social and problem-solving skills. Elimination of tic behaviors alone will not ensure adequate functioning unless the subject has appropriate skills in his or her repertoire. Given the ostracizing effects of the gross movement disorders that characterize Tourette's syndrome, it is likely that subjects suffering from the disorder will not have had normal opportunities to learn appropriate interpersonal responses. Therefore, particular attention should be devoted by future investigators to the interpersonal skill repertoires of persons so afflicted. In this regard, the study by Doleys and Kurtz (1974) is especially noteworthy.

Gilles de la Tourette's Syndrome and Haloperidol

With the reemergence of biological psychiatry, there has been increased interest in brain chemistry and the pharmacological treatment of mental and movement disorders. Haloperidol (haldol), a butyrophenone with effects similar to phenothiazines such as Thorazine, has been widely used as a treatment for Tourette's syndrome. In fact, in medical and psychiatric circles it has been touted as the treatment of choice (Shapiro et al., 1978). Haloperidol and similar drugs act at the neuroreceptors to block dopamine. Shapiro et al. (1978) have presented the most comprehensive review of the syndrome and the psychological, neurological, and treatment data to date. Included in this review are summaries of major biochemical theories of Tourette's syndrome and the use of haloperidol.

There are numerous clinical studies in the literature suggesting that haloperidol is an effective treatment agent for Tourette's syndrome (e.g., Chapel, Brown, & Jenkins, 1964; Seignot, 1961; Shapiro & Shapiro, 1968; Shapiro, et al., 1978). However, none of these studies represent methodologically rigorous investigations. Although these reports, as well as others, do suggest that haloperidol is a useful treatment agent, this does not suggest, as Shapiro et al. (1978) and others argue, that it is the treatment of choice. In addition, the data are not supportive of the contention that behavior therapy is essentially useless in the treatment of Tourette's syndrome (Shapiro et al., 1978, pp. 341–359).

SPASMODIC TORTICOLLIS

Spasmodic torticollis is a disorder manifested by a rotated position of the head to one side. The condition is brought about by clonic or tonic contraction of the cervical muscles, specifically the sternocleidomastoid, the trapezius, and the splenius. Once the disorder has been present for a significant period of time, these muscles become hypertrophied. The rotated-head posture can be a sustained posture to one side (tonic) or can consist of continual jerks (clonic). Spasmodic torticollis is a disorder that appears to have some clearly defined psychological as well as organic etiologies (Brain & Watson, 1969). Several organic conditions have been identified with the etiology of some cases of torticollis. It has been noted to occur as a sequel to encephalitis lethargica or as a part of other extrapyramidal syndromes. Apparently, when organic factors are involved, there is a disturbance of the corpus striatum (Brain & Watson, 1969).

Spasmodic torticollis also develops as a result of significant emotional stress. In these instances, the onset is sudden as contrasted to the insidious onset when organic pathology is involved. The disorder can be found in both men and women and is notoriously resistant to all types of treatment.

Behaviorally oriented clinicians and researchers have used an even greater variety of techniques in the treatment of spasmodic torticollis than those employed in the treatment of Tourette's syndrome. Turner, Hersen, and Alford (1974) used a single-subject withdrawal design to evaluate the effects of massed practice and meprobamate in the treatment of a 45-year-old male. The subject's symptoms were of a 1.5-year duration and were characterized by a slightly downward positioning of the head with jerking movements directed toward the right shoulder. A physical examination had revealed hypertrophy of the left sternocleidomastoid muscle, but neurological examinations did not reveal contributory causes. Previous treatments had been unsuccessful and included chiropractic massage, biofeedback of electromyogram (EMG) levels, and a drug course of haloperidol and diazepam. Massed practice consisted of having the patient voluntarily duplicate tic movements as accurately and rapidly as possible. Meprobamate (400 mg, q.i.d.) was added to massed practice at one point in the treatment design due to clinical considerations but was discontinued in a subsequent phase. Results indicated that massed practice exerted a controlling influence over evocation of involuntary torticollis movements. However, the contributory role of Meprobamate in reducing involuntary torticollis movements was unclear. No follow-up data were presented.

Agras and Marshall (1965) reported the application of massed practice to two cases of spasmodic torticollis with mixed results. The first subject was a 38-year-old woman who was unable to turn her head to the right. A pretreatment physical examination revealed hypertrophy of the right sternocleidomastoid muscle. Excessive activity of the muscle was also confirmed with an EMG examination. The symptoms were apparently of relatively recent onset. A trial period of hypnosis resulted in a marked decrease in the excessive muscle activity, but clinical improvement was short-lived. Massed practice was then instituted. Posttreatment follow-ups revealed considerable improvement 2 and 4 weeks after treatment, and the patient was symptom free 7 months after treatment. Around this time, the death of the patient's father exacerbated her symptoms. On resuming massed practice, however, she was able to control the torticollis. At an 11-month follow-up, she was still exercising approximately 30 minutes a week. At a 22-month follow-up, she was asymptomatic, as confirmed by an EMG examination. The second subject was a 59-year-old female who suffered from spasmodic movements of her head to the right. This symptom had appeared approximately 9 months prior to treatment. In addition, she had experienced tremors of the head and shoulder for approximately 5 years. Hypertrophy of the involved (left) sternocleidomastoid muscle was confirmed in a physical examination and by EMG examination. Despite the fact that voluntary evocation of the tic declined during 70 massed practice sessions, no clinical improvement of EMG change was noted. At a 5-week follow-up, the torticollis had worsened.

Meares (1973) reported even less promising data regarding the treat-

ment of torticollis using massed practice. Out of eight cases treated with
this procedure, success was attained in only one. Thus, equivocal results
have been obtained in the treatment of spasmodic torticollis using
massed practice. Although Turner *et al.* (1974) concluded that massed
practice did exert a controlling influence over involuntary torticollis and
Agras and Marshall (1965) reported having successfully treated one of two
cases using massed practice, other researchers have obtained less promis-
ing results. Several possible explanations for the variability of the find-
ings exist. First, there might have been variations in the massed practice
procedure across studies. For example, the subject in the study by Turner
et al. (1974) practiced his tic movement 400 times during each of three
massed practice sessions per day. Agras and Marshall had one of their
subjects practice her torticollis movement 200 times during one daily
practice session. The second subject engaged in massed practice for 45
minutes daily, with no minimum number of movements required. Fi-
nally, the eight subjects treated by Meares (1973) engaged in massed prac-
tice for a period of 10 minutes. No information is provided regarding the
number of 10-minute treatment periods for each subject, nor for how
many responses were required during massed practice sessions.

A second possible explanation for the variability in the results that
have been obtained using massed practice relates to the differences in
symptoms experienced by subjects in the different studies. As we dis-
cussed earlier, the symptoms comprising spasmodic torticollis can vary
considerably in topography. They can consist of only a cocking of the
head to one side or can involve violent involuntary movements of the
head, usually toward one shoulder. Furthermore, the severity of the dif-
ferent symptoms can vary. It is conceivable that massed practice can
differentially affect various symptom patterns.

In certain respects then, massed practice has been inadequately
evaluated as a treatment for spasmodic torticollis. And although future
research should be conducted to evaluate its efficacy, we believe that
certain other procedures show greater promise. These include electrical
aversive conditioning, feedback, shaping of head movements, and desen-
sitization. Meares (1973) suggested that central to the effective treatment
of spasmodic torticollis might be the use of repetitive head movements
combined with anxiety reduction. He reported the successful use of sys-
tematic desensitization in the treatment of a woman with a 7-year his-
tory of spasmodic torticollis. The woman was desensitized to deviant
head positions using imaginal and *in vivo* hierarchies. The *in vivo* hierar-
chy involved actual movements of the head in various angles of devia-
tion. Although the desensitization procedure was reportedly effective, no
follow-up data were obtained.

Electrical aversive conditioning was used by Brierly (1967) in the
treatment of two cases of spasmodic torticollis. Both subjects were 32
years old, and both suffered from chronic tilting of the head. Previous
medical and psychiatric treatments had failed. Shock was administered

contingent on deviant head positioning while the subjects read material projected onto a wall in front of them. One subject was symptom free at a 1-year follow-up. The second subject relapsed twice under severe stress after a 6-month symptom-free period.

Cleeland (1973) examined the combined effects of continual EMG feedback and contingent shock in the treatment of 10 subjects with spasms of the neck muscles. Nine of the subjects suffered from torticollis, one from retrocollis. Eight of the subjects showed reduced spasm frequency in the laboratory at posttreatment. Six of the 10 showed clinical therapeutic benefit as defined by self-report of stable reduction in spasmodic activity outside of the laboratory. The mean length of follow-up for these six subjects was 19 months. Two additional subjects showed improvement outside of the laboratory but of less than 1-month duration.

Bernhardt, Hersen, and Barlow (1972) conducted an experimental single-case analysis of spasmodic torticollis in a 50-year-old male subject. The subject's symptoms were an upward positioning of the head and a slight tilt to the left side. A neurological examination was negative. A physical examination revealed an enlargement of the left sterno-cleidomastoid muscle. The subject was videotaped while seated during 10-minute experimental sessions. Measurement of the torticollis was made using a grid placed over a videotape monitor. "A shielded observer depressed a switch activating a timer whenever the subject's head was positioned at an angle where the nostril was above a line intersecting the external auditory meatus" (p. 295). Using this measurement apparatus, the effects of instructions to keep the head straight and negative feedback (a light signaling when torticollis was evidenced) were evaluated. Negative feedback resulted in significant decreases in percentage of torticollis during experimental sessions. Instructions did not diminish torticollis but appeared to result in greater variability of performance. Instruction and negative feedback combined were less effective than negative feedback alone.

Finally, Ericksen and Huber (1975) used an operant shaping procedure in the treatment of a 29-year-old male schizophrenic patient with spasmodic torticollis. The subject developed symptoms 8 months prior to treatment, following the loss of his job and the death of his infant daughter. A neurological examination revealed no organic impairment. Valium and milieu therapy had previously been unsuccessful. In the shaping procedure, the subject made small head movements in synchronization with a metronome. Head movements were facilitated by placing two visual target stimuli on the wall in front of the subject. The distance between the visual stimuli was gradually increased. Over an eight-session training period, the subject was able to effect a full head rotation of 180° and regained complete voluntary control of the neck muscles. He remained symptom free at a 9-month follow-up.

None of the various techniques that have been used in the treatment of spasmodic torticollis have been subjected to extensive outcome evalu-

ation. In fact, relatively few cases of the disorder have been reported in the literature. Again, as was the case with regard to Tourette's syndrome, certain of the studies that have evaluated strategies for the treatment of spasmodic torticollis are subject to methodological criticisms. Although massed practice has been evaluated over the greatest number of subjects, variations in the treatment protocol and inadequate data collection (e.g., no or short follow-up) preclude any definitive conclusions regarding its effectiveness. The other strategies—aversive conditioning, feedback, and techniques involving graduated head and neck movements—all appear promising. Again, however, methodological problems affect the conclusiveness of the findings. Brierly's (1967) report of electrical aversive conditioning presents the results of two uncontrolled case studies in which there was a relapse in one subject at a 6-month follow-up. The study by Cleeland (1973) confounded the effects of EMG feedback and shock. Data regarding extralaboratory responding were exclusively gathered by self-report. The negative feedback procedure employed by Bernhardt *et al.* (1972) resulted in improvement in the torticollis during experimental sessions, but no data regarding the generalization or maintenance of responding were presented. Finally, although the subject in the study by Ericksen and Huber (1975) apparently remained symptom free at a 9-month follow-up, treatment was evaluated using an uncontrolled case design. Consequently, the results are left open to debate regarding the potential role of extraneous variables in producing the apparent treatment gains.

Once again, we emphasize the importance of future controlled outcome investigations in this area. Given, the low prevalance of spasmodic torticollis, extensive use of single-case experimental designs is recommended. Firm conclusions regarding the relative effectiveness of the treatment strategies that we have presented here cannot be provided until additional data are available.

BLEPHAROSPASM

Blepharospasm is a disorder characterized by uncontrollable, spontaneous closure of the eye(s). The condition involves involuntary spasm of the orbicularis oculi muscle. The condition, though rare, can be extremely debilitating in that the eyes can be almost always closed and severe facial grimacing can be present. Although it is most common in middle age and elderly women, it can be found in any age or sexual group. It is frequently intermittent and aggravated by emotional stress. Nevertheless, there does not appear to be evidence of significant emotional disturbance (Bender, 1962).

Blepharospasm has been noted to occur as a feature of Parkinson's disease and to present as a side effect of neuroleptic medication. In addition, it can follow some diseases such as encephalitis lethargica. Chronic

blepharospasm has also been noted to accompany head injury, cerebral degenerative conditions, cerebral arteriosclerosis, and various other cerebral conditions (see Bender, 1962, for a full discussion). As can be seen, blepharospasm can be associated with numerous physical conditions. Therefore, it is essential that such patients be given thorough medical evaluations before implementing psychological treatment.

Few cases of blepharospasm have been reported in the literature. An early case study was reported by Costello (1963) in which massed practice was used in the treatment of a 12-year-old male. The subject was instructed to deliberately blink while looking into a mirror for several 5-minute periods daily. A reduction in eye blink frequency was observed 1 year later.

More recently, Frederick (1971) reported a two-phase treatment of blepharospasm in a middle-aged woman. In the first place, systematic desensitization was instituted and resulted in some improvement in tic behavior, although "residuals" of the tic response remained. Massed practice resulted in complete elimination of the response. The subject remained symptom free at a 9-month follow-up. However, no systematic observation of the patient's responding was made and no empirical data were presented.

Roxanas, Thomas, and Rapp (1978) used EMG feedback in the treatment of a 60-year-old woman with blepharospasm compounded by spasmodic torticollis. The subject had an 18-month history of difficulty keeping her eyes open and a persistent tilting of her head. Neurological and endocrinological examinations were negative. Prior to treatment, the distance between the subject's eyelids, the angle and tilt of her head, and the EMG activity in the frontalis muscle were measured at 2-second intervals throughout a 30-minute informal interview. Measurement of the first two variables was made from a videotaped recording of the interview. The pretreatment measurements were repeated immediately after treatment and at a 6-month follow-up. The EMG feedback procedure was started at the second session and continued twice daily for 20 days. During each session, the subject was provided with auditory and visual feedback indicating the EMG activity in the frontalis muscle. She was instructed to try to reduce that activity and to open her eyes for increasing periods as the sessions progressed. The results indicated approximately a 50% improvement from pre- to posttreatment in the distance between the subject's eyelids, as measured during the informal interview procedure. A 10% improvement was noted in the distance between the eyelids at a 6-month follow-up. There was approximately a 55% improvement in the angle of the subject's head tilt as measured during the informal interview procedure at posttreatment. Head tilt was maintained at a 70% improved rate at the 6-month follow-up.

The obvious shortcoming of the literature pertaining to the behavioral treatment of blepharospasm is the limited number of cases that have been reported. Again, we cannot provide firm conclusions regarding

treatment efficacy until additional data have been compiled. Of those strategies that were discussed, the study by Roxanas *et al.* (1978) was the most comprehensive with regard to the reporting of treatment outcome data. The EMG feedback procedure used in their study shows promise as a viable treatment technique. We once again recommend the extensive use of single-case experimental methodologies in future treatment outcome research in this area.

WRITER'S CRAMP

Writer's cramp is a disorder characterized by hand and finger muscle spasms that occurs while attempting to write. Actually, writer's cramp is only one of a group of disorders involving muscle spasms associated with occupational activities (e.g., pianist's or telegraphist's and typist's cramps).

In writer's cramp, the hand and finger muscles spasm such that writing is accomplished in a jerky fashion with the point of the pen sometimes being pushed into the paper. Frequently, the disorder is only evident with fatigue, but it eventually progresses until it is present immediately on beginning to write. Tremor is sometimes present and can progress up the upper limb. The disorder is typically not present outside of writing activities. (For an extended discussion, see Crisp & Moldofsky, 1965; Sylvester & Leversedge, 1960.)

Writer's cramp is unique among the muscle disorders in that there is some consensus in the literature as to how it can be effectively treated, or at least with regard to one component of an effective treatment strategy. Graduated exposure and training programs have been associated with positive outcomes in a number of cases. Crisp and Moldofsky (1965) used behavioral techniques in combination with dynamically oriented verbal psychotherapy in the treatment of seven cases of writer's cramp. The behavioral components of the treatment included instruction in muscle relaxation, correction of writing grip, practicing relaxation while writing, and *in vivo* exposure to a hierarchy of increasingly difficult writing tasks. Six of the seven subjects substantially improved their writing capacity, both in their own estimation and by overt measurement. It was further reported that there was some generalization of this response outside of therapy.

Arora and Murthy (1976) used a similar progression of graduated tasks in the treatment of writer's cramp in a 19-year-old college-educated male. Following instruction in muscle relaxation, the subject engaged in a series of tasks to shape skilled writing behavior. These tasks were first mastered using a paint brush, followed by progression through the same series using a pen. The subject's writing ability improved to normal levels of competence and was maintained at a 6-month follow-up. However, despite the apparent efficacy of the graduated exposure paradigm, very

few cases of writer's cramp have been reported in the literature. Therefore, it is once again necessary to caution against overenthusiastic interpretations of the data until additional corroborating evidence can be accumulated.

OTHER TICS

As was the case with regard to the specific syndromes that have been discussed, a wide variety of behavioral techniques have been used in the treatment of individuals suffering from single or multiple tics that do not comprise a specific syndrome. Perhaps the best known work in this regard is that of Yates (1958, 1970), who proposed the model for the genesis and maintenance of tics that we presented earlier. Yates (1958) evaluated his model utilizing massed practice in a series of experiments with a 25-year-old psychiatric patient. The patient suffered from a 10-year history of a stomach contraction breathing tic, a nasal-explosion tic, a coughing tic, and an eye blink tic. Massed practice resulted in a significant decrease in the voluntary performance of each of the four tics. The patient also reported general decreases in involuntary tic behavior and a significant decrease in anxiety. However, no objective measurement of tic frequency outside of the massed practice trials was obtained. Jones (1960) continued Yates's work with the same patient. Although the use of massed practice led to self-reports of a decrease in the frequency of all four tics, their frequency could be temporarily "exacerbated by illness and by social and vocational frustrations" (p. 257).

Numerous other uncontrolled case studies have been reported in which massed practice was applied in the treatment of either single or multiple tic behaviors (e.g., Ernst, 1960; Lazarus, 1960; Rafi, 1962; St. James-Roberts & Powell, 1979; Walton, 1961, 1964). The results of these applications have been mixed. In several instances where treatment appeared to have been successful, the effects of the massed practice intervention *per se* were confounded with other intervention strategies. For example, although the subject treated by Walton (1961) was almost completely symptom free at a 1-year follow-up, he had been taking tranquilizers on a sporadic basis following hospital discharge. Knepler and Sewall (1974) supplemented negative practice with the use of smelling salts in the treatment of a 20-year-old male with a 4-year history of facial tics. Although treatment was effective, it is unclear to what extent improvement in tic behavior was directly attributable to the effects of massed practice.

The efficacy of negative practice received further evaluation in a recent study by Azrin, Nunn, and Frantz (1980). Results obtained with negative practice were compared with those obtained using habit reversal treatment (Azrin & Nunn, 1973, 1977). Habit reversal treatment is a comprehensive, multifaceted treatment package. Procedures that are em-

phasized as part of treatment include (a) training to emit competing responses involving isometric pressure of the muscles that were opposed to the tic movements, (b) daily self-recording of tic behaviors, (c) identification of situations and persons associated with either a high or a low probability of tic episodes, and (d) relaxation training. Treatment was conducted during one or two sessions of about 2½-hour duration. Subjects were recruited by newspaper advertisements and randomly assigned to either group. They ranged in age from 11 to 62 years. Most of their tics involved the head, neck, or shoulders, but some subjects had eye blinking, torso jerking, grimacing, vocalization, or leg movements. Results indicated that the habit reversal treatment group progressively declined to a 99% reduction at 4- to 6-month follow-ups. An 18-month follow-up indicated a 97% reduction in tic frequency. However, it should be noted that subjects in the negative practice treatment condition received only one treatment session of approximately 2½-hour duration. As other studies have utilized numerous sessions of supervised negative practice, the results might not accurately reflect the efficacy of negative practice.

This criticism notwithstanding, habit reversal treatment appears to be extremely effective in reducing the frequency of a variety of tic behaviors. The results from an earlier evaluation by Azrin and Nunn (1973) using within-subject comparisons lend support to this conclusion. Twelve subjects ranging in age from 5 to 64 years with a variety of maladaptive habits (e.g., fingernail biting) or tics received habit reversal treatment. The data suggest that, in 11 of the 12 subjects, treatment was effective in controlling tic or habit behaviors through at least a 6-month follow-up. Only 4 of the 11 subjects, however, were treated for tics.

To date, the various components comprising habit reversal treatment have not been experimentally analyzed to determine which are effective. However, data from an experimental single-case study by Billings (1978) relate to the efficacy of self-monitoring in controlling tic behavior. The subject was a 17-year-old female with multiple tics. No previous treatment history was reported. The two most severe tics, squinting and a nasal sound, were selected for treatment using a self-monitoring procedure. Baseline observations of the frequency of the two tics were made prior to treatment. During the first phase of the self-monitoring treatment procedure, the subject was instructed to record the occurrence of each eye squint using a wrist counter. During a second treatment phase 2 weeks later, she was provided a second wrist counter and asked to record the frequency of both tics. Self-monitoring was effective in reducing the frequency and intensity of both tics to zero occurrence levels. These effects were maintained at a 6-month follow-up. Experimental control over each separate tic behavior was demonstrated in a single-case experimental design.

Manipulation of the social contingencies associated with tic behaviors was found to be an important component in the treatment of a 14-year-old male with a 9-year history of multiple tics including grunts

and shouts (Schulman, 1974). An initial interview with the subject revealed that the tic behaviors occurred most frequently in the presence of his mother. Following a 3-week baseline period during which the occurrence of tics was recorded by the subject's parents, an extinction procedure was introduced. The subject's mother was instructed to totally ignore the tics. Tic behavior was eliminated in approximately 3 months. Unfortunately, the parents unilaterally terminated treatment at that point. A 2-month follow-up indicated some increase in tics in midtreatment levels.

Clark (1963) reported the use of a procedure resembling desensitization in the treatment of a 30-year-old woman suffering from a hysterical spasm of the jaw muscles and agoraphobia. Clark contended that the jaw muscle spasm was related to anxiety, although no clear evidence of this relationship was presented. The subject was taught muscle relaxation procedures, and anxiety-related topics were discussed. An *in vivo* hierarchy was used in the treatment of the agoraphobia. Although the treatment procedures were apparently successful, no specific outcome or follow-up data were presented.

Recently, Lamontagne (1978) treated a 30-year-old housewife with a similar exposure paradigm. The subject had developed the tic 18 months prior to treatment. As it was louder and more frequent in social situations, Lamontagne conceptualized the tic as a form of social phobia. Treatment involved prolonged exposure to "social situations." The subject sat for longer and longer periods with her therapist and four graduate students. The students sat silently looking at her. Data obtained from self-monitoring, student observations, and surreptitious phone calls suggest that the procedure effectively reduced tic behavior at posttreatment and at a 6-month follow-up.

SUMMARY

The studies reviewed above suggest that, as with the specific syndromes we discussed earlier, a variety of behavioral procedures have been applied in the treatment of single or multiple nervous tics. As the data presented in this chapter attest, a modicum of success has been attained in the treatment of such disorders using various techniques singularly and in combination. But it is apparent that no optimal intervention strategy has been identified for a particular disorder. An obstacle in this regard might be the great variation that exists in the topography of different tic behaviors. Moreover, it appears that a specific tic or movement syndrome can have different or mixed etiologies. Hence, the treatment strategy appropriate for a given instance might depend on the unique etiology of the case at hand. In addition, multiple intervention strategies might be needed in many instances. For example, consider a case of blepharospasm that occurs primarily in heterosocial situations. Massed

practice might well control the tic during treatment, but the effects of treatment are not likely to be maintained unless something is done to ameliorate heterosocial difficulty. Some form of heterosocial skill training might well be appropriate. It is our opinion that, in most cases of movement disorder, something more than a unitary intervention aimed at controlling the movement *per se* is needed. In this regard, it is interesting to note that habit reversal (Azrin *et al.*, 1980), a procedure that is extremely promising, is composed of multiple treatment components.

It is clear to us that the treatment of movement disorders requires some knowledge of the pathophysiology of the particular disorder being treated. Furthermore, it is clear from our earlier discussion of specific syndromes that some movement disturbances can have strictly biological origin, strictly psychological origin, or can be a function of both physical and psychological factors. It seems evident, then, that the behavioral clinician involved in the treatment of these disorders must become familiar with the biological variables that sometimes produce or contribute to a given disturbance.

There has been little attention given to combined behavioral and pharmacological approaches. Yet, pharmacotherapy is the primary means of treatment in the medical community, and there are data to suggest that drugs are effective in some instances. This is particularly true in Gilles de la Tourette's syndrome, where haloperidol is considered by some to be the treatment of choice. Regardless of etiology, drugs might well prove useful and could potentiate or facilitate the effects of behavioral interventions. Future studies should be directed at evaluating the synergistic action of drugs and behavioral strategies.

Finally, the rarity of most movement disorders has precluded largescale experimental studies of behavioral treatments. Single-case experimental designs have been available for some time but have not been employed to the degree that is desirable. In our opinion, such designs are ideally suited for these disorders and should be extensively employed in studying the effects of behavioral and drug treatments.

REFERENCES

Agras, S., & Marshall, C. The application of negative practice to spasmodic torticollis. *American Journal of Psychiatry*, 1965, *122*, 579–582.

Arora, M., & Murthy, S. Treatment of writer's cramp by progression from paintbrush in supinated hand. *Journal of Behavior Therapy and Experimental Psychology*, 1976, *7*, 345–347.

Azrin, N. H., & Nunn, R. G. Habit-reversal: A method of eliminating nervous habits and tics. *Behaviour Research and Therapy*, 1973, *11*, 619–628.

Azrin, N. H., & Nunn, R. G. *Habit control: Stuttering, nail biting, and other nervous habits.* New York: Simon & Schuster, 1977.

Azrin, N. H., Nunn, R. G., & Frantz, S. E. Habit reversal vs. negative practice treatment of nervous tics. *Behavior Therapy*, 1980, *11*, 169–178.

Bender, M. B. Neuro-ophthalmology. In A. B. Becker (Ed.), *Clinical neurology* (2nd ed.). New York: Hoeher-Harper, 1962.

Bernhardt, A. J., Hersen, M., & Barlow, D. H. Measurement and modification of spasmodic torticollis: An experimental analysis. *Behavior Therapy*, 1972, *3*, 294–297.

Billings, A. Self-monitoring in the treatment of tics: A single subject analysis. *Journal of Behavior Therapy and Experimental Psychiatry*, 1978, *9*, 339–342.

Brain, L., & Watson, J. N. *Brain's diseases of the nervous system* (7th ed.). London: Oxford, 1969.

Brierly, H. The treatment of hysterical spasmodic torticollis by behavior therapy. *Behaviour Research and Therapy*, 1967, *5*, 139–142.

Chapel, J. L., Brown, N., & Jenkins, R. L. Tourette's disease: Symptomatic relief with haloperidol. *American Journal of Psychiatry*, 1964, *121*, 608–610.

Clark, D. F. The treatment of hysterical spasm and agoraphobia by behavior therapy. *Behaviour Research and Therapy*, 1963, *1*, 245–250.

Clark, D. F. Behaviour therapy of Gilles de la Tourette's syndrome. *British Journal of Psychiatry*, 1966, *112*, 771–778.

Cleeland, C. S. Behavioral techniques in the modification of spasmodic torticollis. *Neurology*, 1973, *23*, 1241–1247.

Cohen, D., & Marks, F. M. Gilles de la Tourette's syndrome treated by operant conditioning. *British Journal of Psychiatry*, 1977, *130*, 315.

Costello, C. G. The essentials of behavior therapy. *Canadian Psychiatric Association Journal*, 1963, *8*, 162–166.

Crisp, A. H., & Moldofsky, H. A psychosomatic study of writer's cramp. *British Journal of Psychiatry*, 1965, *111*, 841–858.

Doleys, D. M., & Kurtz, P. S. A behavioral treatment program for Gilles de la Tourette syndrome. *Psychological Reports*, 1974, *35*, 43–48.

Dunlap, K. *Habits: Their making and unmaking.* New York: Liveright, 1932

Ericksen, R. A., & Huber, H. Elimination of hysterical torticollis through the use of a metronome in an operant conditioning paradigm. *Behavior Therapy*, 1975, *6*, 405–406.

Ernst, E. Personal communication to H. G. Jones. (Cited in Jones, H. G. Continuation of Yates' treatment of a ticqueur. In H. G. Eysenck (Ed.), *Behaviour therapy and the neuroses.* London: Pergamon, 1960.)

Feldman, R. B., & Werry, J. S. An unsuccessful attempt to treat a ticqueur by massed practice. *Behaviour Research and Therapy*, 1966, *4*, 111–117.

Fernando, S. J. M. Gilles de la Tourette syndrome: A report on four cases and a review of published case reports. *British Journal of Psychiatry*, 1967, *113*, 607–617.

Frederick, C. J. Treatment of a tic by systematic densensitization and massed response evocation. *Journal of Behavior Therapy and Experimental Psychiatry*, 1971, *2*, 281–283.

Gilby, W. Efficacy of electricity in contraction of the muscle of the neck. *Lancet*, 1825, *8*, 280.

Guze, S. B. The future of psychiatry: Medicine or social science? An editorial. *Journal of Nervous and Mental Disease*, 1977, *165*, 225–230.

Hollandsworth, J. G., Jr., & Bausinger, L. Unsuccessful use of massed practice in the treatment of Gilles de la Tourette's syndrome. *Psychological Reports*, 1978, *43*, 671–677.

Hutzell, R. R., Platzek, D., & Logue, P. E. Control of symptoms of Gilles de la Tourette's syndrome by self-monitoring. *Journal of Behavior Therapy and Experimental Psychiatry*, 1974, *5*, 71–76.

Jones, H. G. Continuation of Yates' treatment of a ticqueur. In H. J. Eysenck (Ed.), *Behaviour therapy and the neuroses.* London: Pergamon, 1960.

Kazdin, A. E., & Wilson, G. T. *Evaluation of behavior therapy: Issues, evidence, and research strategies.* Cambridge, Mass.: Ballinger, 1978.

Kelman, D. H. Gilles de la Tourette disease in children: A review of the literature. *Journal of Child Psychology and Psychiatry*, 1965, *6*, 219–226.

Knepler, K. N., & Sewall, S. Negative practice paired with smelling salts in the treatment of a tic. *Journal of Behavior Therapy and Experimental Psychiatry*, 1974, *5*, 189–192.

Lahey, B. B., McNees, M. P., & McNees, M. C. Control of an obscene "verbal tic" through timeout in an elementary school classroom. *Journal of Applied Behavior Analysis*, 1973, *6*, 101–104.

Lamontagne, Y. Treatment of a tic by prolonged exposure. *Behavior Therapy*, 1978, *9*, 647–651.

Lazarus, A. A. Objective psychotherapy in the treatment of dysphenia. *Journal of South African Logopedic Society*, 1960, *6*, 8–10.

Meares, R. A. Behavior therapy and spasmodic torticollis. *Archives of General Psychiatry*, 1973, *28*, 104–107.

Meige, H., & Feindel, E. *Tics and their treatment.* London: Appelton, 1907.

Miller, A. L. Treatment of a child with Gilles de la Tourette's syndrome using behavior modification techniques. *Journal of Behavior Therapy and Experimental Psychiatry*, 1970, *1*, 319–321.

Mostofsky, D. I. Recurrent paroxysmal disorders of the central nervous system. In S. M. Turner, K. S. Calhoun, & H. E. Adams (Eds.), *Handbook of clinical behavior therapy.* New York: Wiley, 1981.

Mowrer, O. H. *Learning theory and behavior.* New York: Wiley, 1960.

Nicassio, F. J., Liberman, R. P., Patterson, R. L., Ramirez, E., & Sanders, N. The treatment of tics by negative practice. *Journal of Behavior Therapy and Experimental Psychiatry*, 1972, *3*, 281–287.

Poore, Dr. Case of clonic torticollis treated by the continuous galvanic current and the rhythmical exercise of the affected muscles. *Lancet*, 1873, *2*, 520–521.

Rafi, A. A. Learning theory and the treatment of tics. *Journal of Psychosomatic Research*, 1962, *6*, 71–76.

Rosen, M., & Wesner, C. A behavioral approach to Tourette's syndrome. *Journal of Consulting and Clinical Psychology*, 1973, *41*, 308–312.

Roxanas, M. R., Thomas, M. R., & Rapp, M. S. Biofeedback treatment of blepharospasm with spasmodic torticollis. *Canadian Medical Association Journal*, 1978, *119*, 48–49.

Sand, P., & Carlson, C. Failure to establish control over tics in the Gilles de la Tourette syndrome with behaviour therapy techniques. *British Journal of Psychiatry*, 1973, *122*, 665–670.

Savicki, V., & Carlin, A. S. Behavioral treatment of Gilles de la Tourette syndrome. *International Journal of Child Psychotherapy*, 1972, *1*, 92–109.

Schulman, M. Control of tics by maternal reinforcement. *Journal of Behavior Therapy and Experimental Psychiatry*, 1974, *5*, 95–96.

Seignot, M. J. N. Un cas de maladie der tics de Gilles de la Tourette gueri par le R, 1625. *Annals of Medical Psychology*, 1961, *119*, 578–579.

Shapiro, A. K., & Shapiro, E. Treatment of Gilles de la Tourette's syndrome with haloperidol. *British Journal of Psychiatry*, 1968, *114*, 345–350.

Shapiro, A. K., Shapiro, E., Wayne, H. L., & Bruun, R. D. Tourette's syndrome: Summary of data on 34 patients. *Psychosomatic Medicine*, 1973, *35*, 419–435.

Shapiro, A. K., Shapiro, E. S., Bruun, R. D., & Sweet, R. D. *Gilles de la Tourette syndrome.* New York: Raven, 1978.

Solomon, R. L., & Wynne, L. C. Traumatic avoidance learning: The principles of anxiety conservation and partial irreversibility. *Psychological Review*, 1954, *61*, 353–385.

St. James-Roberts, N., & Powell, G. E. A case study comparing the effects of relaxation and massed practice upon tic frequency. *Behaviour Research and Therapy*, 1979, *17*, 401–403.

Sylvester, J. O., & Leversedge, L. A. A follow-up study of patients treated for writer's cramp by conditioning techniques. In H. J. Eysenck (Ed.), *Behaviour therapy and the neuroses.* London: Pergamon, 1960.

Thomas, E. J., Abrams, K. S., & Johnson, J. B. Self-monitoring and reciprocal inhibition in

the modification of multiple tics of Gilles de la Tourette's syndrome. *Journal of Behavior Therapy and Experimental Psychiatry*, 1971, *2*, 159–171.

Tophoff, M. Massed practice, relaxation and assertion training in the treatment of Gilles de la Tourette's syndrome. *Journal of Behavior Therapy and Experimental Psychiatry*, 1973, *4*, 71–73.

Turner, S. M., Hersen, M., & Alford, H. Effects of massed practice and meprobamate on spasmodic torticollis: An experimental analysis. *Behaviour Research and Therapy*, 1974, *12*, 259–260.

Varni, J. W., Boyd, E. F., & Cataldo, M. F. Self-monitoring, external reinforcement, and timeout procedures in the control of high rate tic behaviors in a hyperactive child. *Journal of Behavior Therapy and Experimental Psychiatry*, 1978, *9*, 353–358.

Walton, D. Experimental psychology and the treatment of a ticqueur. *Journal of Child Psychology and Psychiatry*, 1961, *2*, 148–155.

Walton, D. Massed practice and simultaneous reduction in drive level—further evidence of the efficacy of this approach to the treatment of tics. In H. J. Eysenck (Ed.), *Experiments in behavior therapy*. London: Pergamon, 1964.

Yates, A. J. The application of learning theory to the treatment of tics. *Journal of Abnormal and Social Psychology*, 1958, *56*, 175–182.

Yates, A. J. *Behavior therapy*. New York: Wiley, 1970.

Respiratory Disorders
Asthma

NANCY RAINWATER AND A. BARNEY ALEXANDER

INCIDENCE AND SCOPE

Asthma is a syndrome that results in disability and disruption of regular life patterns. As estimated 8.6 million Americans currently suffer from the disorder (approximately 4% of the population) and a total of 14 million people (or 7% of the population) either have been in the past or presently are handicapped by asthma (Davis, 1972). Compared to heart disease and cancer, asthma does not have a high mortality rate; however, the disorder does account for between 2,000 (Segal, 1976) and 4,000 (Davis, 1972) deaths per year. In addition, the disabling effects of asthma on the lives of its victims can be extensive. In children under the age of 17, asthma is the leading cause of limitation in activity (National Center for Health Statistics, 1971) and accounts for almost a quarter of all days that chronically ill children are absent from school (Schiffer & Hunt, 1963). During 1968, 134,000 hospitalized patients were diagnosed as having asthma and/or hay fever. These patients had an average hospital stay of 8.3 days, costing approximately $62 million ("Figures on expense," 1971). In addition, Davis (1972) cites research stating that asthma accounts for 5 million days lost from work, 7 million days lost from school, and 27 million patient visits to physicians in one year. The economic

costs of asthma are also high. Based on drug industry estimates, Creer (1978) states that in 1975 patients spent $224.2 million for bronchodilators, $24.7 million for corticosteroids, and $43 million for over-the-counter remedies for asthma. With the additional costs of physician and hospital care, Cooper (1976) estimates that the total costs due to asthma in one year, exclusive of mortality, were $1.3 billion.

Thus, although relatively few deaths are attributable to asthma, the disorder has profound impact on patients and their families. Asthmatic children lose a great many days from school and, consequently, fall behind their classmates academically, might not be allowed to participate in strenuous sports activities, and spend a great amount of time on visits to physicians and in taking medications. Adult asthmatics can be limited in the type of occupation they choose, lose days from work, have difficulty with insurance, and be limited in where they live. Families of asthmatics can find their lives revolving around the patient's disorder—for example, canceling vacation plans or making late night trips to the emergency room. Obviously, the syndrome can be very disabling and disruptive to daily patterns of life.

Obtaining a satisfactory definition of asthma has been problematic. The word asthma has Greek origins that mean *panting*. It has often been applied to syndromes characterized by shortness of breath. A more specific, functional, and current definition is that asthma "is a variable, intermittent reversible airways obstruction" (Chai, 1975, p. 2). Airways obstruction refers to a narrowing of the large and/or small airways resulting in impaired gas exchange. The narrowing of airways can be due to edema of the cell walls, hypersecretion of mucus, or bronchospasm. Also, by definition, lung functions in an asthmatic (as opposed, for example, to someone with emphysema) will reverse to normal functioning with time, environmental change, or appropriate medical treatment. Attacks will occur at intermittent intervals and will vary as to their severity. Some asthmatics have only sporadic attacks with few symptoms. These attacks are generally characterized by mild wheezing and respond rapidly to medical treatment. In these cases, symptoms might occur after physical exertion or seasonally in reaction to a particular allergen. In severe asthmatics, however, the situation can be much graver. For these patients, an acute attack can be overwhelming and develop into a condition known as *status asthmaticus* in which the patient responds to medical treatment only very slowly and can approach death. Because this condition is very difficult to treat and can result in death, the focus of standard medical treatment is to *manage* the symptoms of asthma in order to *avoid* status asthmaticus.

MEDICAL MANAGEMENT

Medical management of asthma initially consists of attempting to detect the factors precipitating the attacks so that they may be controlled.

For example, the physician will try to determine which allergens, if any, cause attacks. Although its effectiveness has not been thoroughly demonstrated, immunotherapy (the familiar "allergy shots") might be considered. Second, the physician will administer medications to help control or eliminate asthmatic symptoms. Generally, a theophylline-based drug will be administered first. If this drug is not sufficient on an oral basis to control the asthma, then an inhaled bronchodilator will be added to the regimen. If these medications are insufficient, an inhaled steroid will be added. Finally, in difficult cases of chronic intractable asthma, the patient will be placed on regular oral corticosteroids (usually prednisone). For a more detailed description of the medical management of asthma, see Alexander (in press).

Asthma presents several difficulties to physicians. First, in a minority of asthmatics there are no identifiable precipitating factors. Because there are no apparent external factors causing the symptoms, these patients are said to have *instrinsic* asthma. In the past, these patients have occasionally had difficulty in receiving appropriate treatment from physicians who were not well trained in the treatment of asthma and from families and friends who did not understand the disorder. People inexperienced with the syndrome had a tendency to label many of these patients "psychosomatic," which usually represented a lack of understanding of the disease and a grossly unfair and inaccurate characterization that the illness was "all in the patient's head."

A second difficulty in the medical treatment of asthma is that the medications can have severe side effects. Theophylline levels must be closely monitored because excessive doses are toxic, and steroids can be particularly harmful, especially when administered to children. Side effects of steroids include stunted growth, edema, insomnia, moonface, amenorrhea, delayed sexual development, cataracts, osteoporosis, psychic disturbances, and thromboembolism. As a consequence, the physician will attempt to place the patient on a low, alternate-day dosage if symptom control can be maintained. Because the exogenous steroid suppresses adrenal function, this regimen tends to allow adrenal function recovery on the off-medication day.

A third aspect in the treatment of asthma is common to the treatment of all chronic illnesses and is focused on the problems that result from having the disorder—that is, adjustment to having a chronic medical disease. Adjustment includes compliance with the medical regimen, coping with the symptoms of the disorder itself, and coping with family and friends' reactions to the asthma. This area of asthma-related behaviors is one in which behavioral psychology must play an important role.

Historically, some influential etiological theories (e.g., psychoanalytic hypotheses) claimed that psychological variables played an important role in the pathogenesis of asthma. However, after some two decades of research, there has been no convincing evidence that this is the case, and the majority of asthma scientists have concluded that psychological

components do not play any significant role in the etiology of asthma. Although the data is not definitive in this area, the position that asthma should not be considered a psychosomatic illness warrants careful consideration for several reasons. First, unquestioning adherence to the psychosomatic view diverts investigators from focusing on the impact of psychological variables on lung functioning that develops after the inception of asthma. Second, this view has laid the foundation for treating asthma as an "all in the head" disorder. To consider asthma a "mental" disorder is grossly unfair to its victims in that it can deprive them of appropriate medical care and cause them to feel guilt and blame for being sick. Finally, the psychosomatic label can add an additional stress on already chronically ill people because of factors over which they generally have no control.

The evidence is less clear regarding the effect emotional stress can have in contributing to attacks, but here, too, the influence seems to be minimal at most in the majority of asthmatics. The most current view is that psychological problems largely arise as a result of having a chronic disorder such as asthma. (For more detailed discussions of this position, see Alexander & Solanch, 1980; Creer, 1979). Therefore, this chapter will address behavioral interventions focusing on maladaptive behaviors that have developed as a result of being asthmatic, not behaviors that allegedly contribute to "getting" asthma in the first place.

BEHAVIORAL APPROACHES TO THE TREATMENT OF ASTHMA

Because the drugs used to treat asthma can have dangerous side effects, the hope has been that behavioral approaches might be able significantly to alter lung functioning and, thereby, reduce the need for medication. Therefore, early behavioral studies in the field of asthma addressed the application of behavioral principles in the actual alteration of lung functioning. Because exercise often precipitates bronchospasm, investigators speculated that relaxation might have the reverse effect of allowing the bronchial muscles to relax. The rationale was that muscular relaxation would enlarge airways, thereby reversing lung functions to a more normal state. Both relaxation and biofeedback were used in attempts to alter physiological responding in asthma.

Biofeedback was used to train patients to decrease airways resistance in patients with asthma by Feldman (1976) and Vachon and Rich (1976). Both studies reported very small changes in bronchodilation in some asthmatics. However, biofeedback procedures to change pulmonary functions require expensive equipment and virtually breath-by-breath monitoring. Also, the methodology of monitoring pulmonary functioning is not as rigorous or sophisticated as that in other areas such as cardiovas-

cular functioning. Therefore, it is premature to assume that biofeedback procedures would be a useful tool in teaching asthmatics to control their lung functioning operantly.

The first study to assess relaxation as a treatment for asthma was conducted by Alexander, Miklich, and Hershkoff (1972) at the National Asthma Center. The subjects were 36 children with asthma were matched on age, sex, and severity of asthma. Of these children, 20 (the experimental group) were taught modified progressive relaxation during six training sessions. The remaining 16 children (the control group) were requested to sit quietly during six sessions. Before and after each session, peak expiratory flow rates were monitored and the children were asked to subjectively rate their feelings of relaxation. Peak expiratory flow rates for children who were trained to relax showed a statistically significant change of about 11%. In addition, experimental subjects reported subjective increases in relaxation and control subjects did not. These results were replicated in a second study (Alexander, 1972) within a single-subject design. Further research at the National Asthma Center has continued to evaluate the effect of relaxation on asthma. Tal and Miklich (1976) used "quasihypnotic" relaxation tapes in three training sessions with 60 subjects and found a small, but statistically significant, change in forced expiratory volume in 1 second (FEV_1). Alexander, Cropp, and Chai (1979) compared resting quietly with relaxation training by assessing a complete battery of lung functioning pre- and postsessions. Again, results demonstrated a small but statistically significant change.

Results of these studies lead to the conclusion that one must be cautious in assuming that relaxation techniques help asthma. The dependent physiological measure used in several of these studies (peak expiratory flow rate) is an effort-dependent measure that can vary considerably depending on the patient's cooperation. Second, the changes that did occur in each of these studies are not clinically significant; that is, subjects' lung functioning was not in the normal range predicted for their sex, age, height, and weight after treatment. Therefore, Alexander and his colleagues have concluded that relaxation is not clinically beneficial for children with asthma. (For an in-depth review of the application of relaxation and biofeedback to asthma, see Alexander & Solanch, 1980.)

Therefore, although behavior therapists can still play a vital role in the treatment of asthma, behavioral strategies will rarely, if ever, represent the primary therapeutic modality. The behaviorist will invariably find him or herself working with secondary, albeit often highly important, problems associated with the disorder and its medical treatment. Therefore, the following discussion will focus on behavioral strategies for dealing with asthma-related behaviors and not the physiological aspect of asthma itself. Two previous papers have reviewed this work and have been drawn on heavily in the present chapter (Alexander & Solanch, 1980; Creer, 1978).

Positive Reinforcement

A major problem in treating any chronically ill patient is the proper taking of prescribed medications, thereby receiving the correct dose. Many asthmatics use nebulized drugs that should be inhaled in a precise manner in order to be maximally effective for intermittent symptoms. Therefore, the correct use of inhalants is an integral part of compliance to the medical regimen in asthma management. Renne and Creer (1976) addressed this problem by applying positive reinforcement. They treated four asthmatic children who could not correctly use a device for administering a nebulized drug. This device automatically delivers a bronchodilating drug to the lungs under positive pressure. Employing a multiple-baseline design across behaviors for experimental control, these researchers taught all four children to use the machine by positively reinforcing successively closer approximations to proper utilization. Three responses (eye fixation, facial posturing, and diaphragmatic breathing) were sequentially trained. The success of this training procedure was documented by the reduced amount of drug required during subsequent treatments for relief of asthma symptoms. An advantage of this procedure is that it has been demonstrated to be successful when administered by non–behaviorally trained hospital staff. In a second phase of the experiment, nurses were taught how to employ successfully the positive reinforcement procedure with two additional children.

Satiation

Ayllon (1963) first applied the laboratory technique of satiation in a clinical setting. The technique involves providing such large amounts of a reinforcer that it loses its reinforcing properties. In this case, an institutionalized woman who hoarded towels was given more and more towels by hospital staff until she threw them out and stopped hoarding. Creer (1978) employed this strategy in the treatment of a young asthmatic boy. Behavioral analysis had revealed that this patient used demands for admission to the National Asthma Center acute care unit as a means of avoiding stressful events at school (e.g., tests). After each brief hospitalization period of 1 day, the boy would claim he was well and request release. Treatment consisted of hospitalizing the child for 3 days rather than only 1 day each time he requested admission. During the 8 months prior to the initiation of the procedure, 33 hospitalizations had occurred, in addition to 11 more during the month in which treatment was implemented. In the 8 months following the procedure, there were only 12 hospital admissions. Evidence that the reduction in hospital admissions was a result of the procedures employed rather than a change in the severity or therapeutic control of the child's asthma was reflected by the total absence of changes in all other indices of asthma—medication requirements, daily lung function tests, and so forth.

Extinction

In a similar case of environmental factors exacerbating maladaptive behavior, excessive coughing episodes in a 7-year-old asthmatic boy were successfully reduced by Neisworth and Moore (1972) employing a simple extinction procedure. Although coughing is a frequent concomitant of asthma, this child's physician felt that the amount of coughing displayed was entirely inconsistent with the severity of his disease. Behavioral analysis revealed that parental attention was probably maintaining the coughing behavior, which occurred particularly frequently at night. To initiate the intervention, the child's parents were instructed not to interact with their son once he was in bed. In accordance with expectations, the procedure resulted in a rapid and systematic reduction in the coughing behavior.

Systematic Desensitization

During an asthma attack, several behaviors can be paired. In the beginning, the patient can feel constriction in the chest, followed by mild wheezing that can progressively worsen and finally develop into a full-blown attack. Not surprisingly, then, in some asthmatics a conditioned fear response to the initial symptom of wheezing is established. Alexander (1977) describes in detail the use of both imagined and *in vivo* systematic desensitization in the treatment of patients demonstrating a learned fear to asthma symptoms. In one case described by Alexander (1977), a child who experienced anxiety when he wheezed even slightly participated in *in vivo* desensitization. During initial sessions, the child was taught relaxation techniques. Prior to subsequent sessions, the patient's nebulized bronchodilators were withheld for increasingly longer durations. Therefore, during therapy sessions, the child was instructed in relaxation while he was experiencing progressively more wheezing. This procedure lends itself nicely to appreciation in an outpatient setting. However, the successful use of systematic desensitization usually requires the expertise of a trained behavior therapist.

Time-Out

An inappropriate behavior that can develop in any chronically ill person is malingering. This maladaptive behavior can understandably, be shaped and maintained by a family or hospital staff that has seen a patient during a frightening, life-threatening attack. Because malingering is often reinforced by additional attention and care, a tactic that has been used successfully in its treatment is time-out from positive reinforcement. Creer and his colleagues (Creer, 1970; Creer, Weinberg, & Molk, 1974) have provided two reports of the use of time-out procedures to treat malingering in asthmatic children who were residential patients at the

National Asthma Center. In each case, a reversal design consisting of baseline, time-out, return to baseline, and reinstatement of time-out contingencies was employed. During the treatment phases, each time the children requested inappropriate hospitalizations they were placed in rooms by themselves, with no television, comic books, games, and so on. In general, the atmosphere was a quiet and unstimulating one appropriate for a "sick" child. Appropriateness of request for hospitalization based on medical need was judged by the admitting physician who was blind to the presence of an experimental intervention. In each case, frequency and duration of hospital visits were dramatically decreased when the effects of the time-out procedures were compared to levels during baseline. Again, no other indices of asthma were found to change during the period of investigation, underscoring the specificity of the treatment.

Negative Reinforcement and Punishment

Negative reinforcement is the removal of an aversive consequence contingent on the occurrence of the desired behavior, whereas punishment is the application of an aversive consequence contingent on the emission of an undesirable behavior. Aversive therapeutic methods usually represent the treatment of last resort due to legal, humanitarian, and ethical considerations. However, in carefully selected cases when used cautiously, aversive techniques can become the treatment of choice. The following case studies illustrate this point.

Both negative reinforcement and punishment procedures were integrated into the treatment of a case of psychogenic cough reported by Alexander, Chai, Creer, Miklich, Renne, and Cardosa (1973). This 15-year-old boy had suffered from a chronic cough for 14 months prior to initiation of behavioral intervention. No organic basis for the cough could be demonstrated, and, thus, extensive medical treatment attempts had failed. Family behavioral analysis revealed a plausible conditioning history for the cough, and four specific cough precipitants were identified: the odors of beef grease, shampoo, hair spray, and bath soap. It was decided to treat the cough with a "response suppression shaping procedure." In order to avoid a brief, 5-mA electric shock to the forearm, the patient was required to suppress coughing (the avoidance response) for increasingly longer periods following the controlled inhalation of a precipitating stimulus. The first precipitant required 75 conditioning trials; 51 of these represented successful avoidance responses, that is, no cough within the critical avoidance interval. The remaining 24 trials included coughing that occurred during the critical interval, and punishment was administered. Finally, the boy began to report no urge to cough following inhalations. The next precipitant required 60 trials to criterion, followed by 15 for the third precipitant and, finally, only one trial for the fourth. Only 5 days were necessary for the conditioning treatment. A prominent

feature of this case was that the coughing had been maintained by contingent attention being paid to it by family members. However, simple extinction procedures, such as those employed by Neisworth and Moore (1972) described earlier, had proven unsuccessful in suppressing the cough. Indeed, much of the family's life had come to revolve about "the problem." The nature of the precipitating stimulus had required considerable accommodations in the eating and toilet habits of the family—a source of almost constant family disruption and stress. Behavioral intervention at the family level was necessary to alter reinforcement patterns in order that coughing not be reestablished once it had been eliminated by the suppression procedure. There has been no recurrence of coughing in the more than 6 years that have elapsed since the conclusion of treatment.

Another case of chronic cough was treated by Creer, Chai, and Hoffman (1977) using punishment procedures alone. In this instance, a 14-year-old boy was exhibiting almost continuous coughing for which, again, no organic basis could be determined. Here, too, extensive medical treatment efforts had failed. The coughing had become so persistent and disruptive that school officials found it necessary to suspend the boy from school until the problem could be resolved. Creer and his colleagues considered the coughing to be a learned response of unknown origin, but extinction procedures exhibited no effect. Because no specific precipitating stimuli could be isolated, a decision was made to employ a simple punishment method. Following baseline assessment, which revealed a very high coughing rate, it was explained to the boy that he was going to receive a moderate (5-mA) electric shock to his forearm each time he coughed. Dramatic results ensued. After only one shock, complete suppression of the response was attained. A 3-year follow-up of this patient revealed neither recurrence of coughing nor the appearance of any other maladaptive respiratory pattern.

The most recent application of conditioned suppression procedures at the National Asthma Center involved the case of a 14-year-old asthmatic girl who likewise exhibited a persistent chronic cough that was treated by Alexander and Loren (Alexander, in press). As in the previous case, behavior analysis failed to isolate specific precipitating stimuli and baseline observation revealed a rather uniform frequency of 10–15 coughs per minute during waking hours. Prior to treatment, the patient displayed volitional control over her coughing sufficient to reduce the baseline rate by approximately 50%. Conditioned response suppression, similar to that employed by Alexander *et al.* (1973), was used. Seven sessions encompassing 150 deconditioning trials were required to effect complete suppression of the maladaptive coughing. On only 9 of the 150 trials did she fail to suppress coughing prior to termination of the systematically increasing critical suppression intervals and, thus, received a shock. A 1-year follow-up has revealed absolutely no recurrence of her previous maladaptive coughing.

CONCLUSIONS

Several aspects of the studies reviewed should be addressed. First, the subjects in each of these cases have been children. Children have been the most readily available population at residential treatment facilities such as the National Asthma Center, where most of the studies with asthmatics have been conducted. However, there is no reason to suspect that the same operant principles applied to similar problems in adults would not be equally successful.

Second, most of these experiments have involved the cooperation of more than one discipline. Asthma is primarily a physical disorder, and judgments of severity of attacks, necessity for hospitalization, and proper medications therefore need to be made by a physician. The behavior therapist is the person with the most expertise in analyzing the maladaptive, asthma-related behaviors. Once a behavioral analysis has been conducted, some techniques might be successfully applied by hospital staff, as in teaching the proper use of inhaled bronchodilators by Renne and Creer (1976), or by parents, as exemplified in the case of the child with the chronic cough at night reported by Neisworth and Moore (1972). Other procedures, such as the use of systematic desensitization, should remain in the hands of a trained behavior therapist.

A clear trend in the treatment of asthma as well as other chronic disorders is the increased involvement of a variety of disciplines. In order to maximize their input into the treatment of physical disorders, behaviorists from whatever discipline need a basic understanding of the physiological aspects of the disorder with which they are working. This will allow them to understand their proper role in treatment. Rather than attempting to intervene with the physiological symptoms of the disease (e.g., wheezing), they can understand their limitations, focus on the behaviors they can change (e.g., asthma-related behaviors), and maximize their usefulness.

This point leads to a third aspect of the application of behavioral approaches to asthma treatment—namely, that behavioral techniques have not been found to be successful in the alteration of lung functioning in asthma. Results of direct intervention attempts on pulmonary physiology have generally shown statistically, but not clinically, significant effects. Based on these results, it is now clear that researchers should focus future scientific efforts primarily on the behavioral procedures intended to alter emotional concomitants of asthma and asthma-related, maladaptive behaviors.

The studies presented here represent a full appreciation of the growing acceptance by researchers and clinicians alike that behavioral treatment methods in asthma should be viewed within the total rehabilitation context and that they should rarely, if ever, be expected to alter either the pathophysiological substrates in asthma or even the day-to-day manifes-

tations of the pathophysiological processes as represented in asthma symptoms.

REFERENCES

Alexander, A. B. Systematic relaxation and flow rates in asthmatic children: Relationship to emotional precipitants and anxiety. *Journal of Psychosomatic Research*, 1972, *16*, 405–410.

Alexander, A. B. Behavioral methods in the clinical management of chronic asthma. In R. B. Williams & W. D. Gentry (Eds.), *Behavioral approaches to medical practice*. Cambridge, Mass.: Ballinger, 1977.

Alexander, A. B. Asthma. In S. M. Haynes & L. Gannon (Eds.), *Psychosomatic disorders: A psychophysiological approach to etiology and treatment*. New York: Gardner Press, in press.

Alexander, A. B., & Solanch, L. S. Psychological aspects in the understanding and treatment of bronchial asthma. In J. Ferguson & C. B. Taylor (Eds.), *Advances in behavioral medicine*. New York: Spectrum, 1980.

Alexander, A. B., Miklich, D. R., & Hershkoff, H. The immediate effects of systematic relaxation training on peak expiratory flow rates in asthmatic children. *Psychosomatic Medicine*, 1972, *34*, 388–394.

Alexander, A. B., Chai, H., Creer, T. L., Miklich, D. R., Renne, C. M., & Cardosa, R. The elimination of psychosomatic cough by response suppression shaping with electric shock. *Journal of Behavior Therapy and Experimental Psychiatry*, 1973, *4*, 75–80.

Alexander, A. B., Cropp, G. J. A., & Chai, H. The effects of relaxation training on pulmonary mechanics in children with asthma. *Journal of Applied Behavior Analysis*, 1979, *12*, 27–35.

Ayllon, T. Intensive treatment of psychotic behavior by stimulus satiation and food reinforcement. *Behaviour Research and Therapy*, *1963*, *1*, 53–61.

Chai, H. Management of severe chronic perennial asthma in children. *Advances in Asthma and Allergy*, 1975, *2*, 1–12.

Cooper, B. *The economic costs of selected respiratory diseases, 1972*. Unpublished report prepared for the Division of Lung Diseases Task Force on Prevention, Control and Education in Respiratory Diseases, 1976.

Creer, T. L. The use of time-out from positive reinforcement procedure with asthmatic children. *Journal of Psychosomatic Research*, 1970, *14*, 117–120.

Creer, T. L. Asthma: Psychological aspects and management. In E. Middleton, C. Reed, & E. Ellis (Eds.), *Allergy: Principles and practice*. St. Louis: C. V. Mosby, 1978.

Creer, T. L. *Asthma therapy: A behavioral health care system for respiratory disorders*. New York: Springer, 1979.

Creer, T. L., Weinberg, E., & Molk, L. Managing a hospital behavior problem: Malingering. *Journal of Behavior Therapy and Experimental Psychiatry*, 1974, *5*, 259–262.

Creer, T. L., Chai, H., & Hoffman, A. The application of punishment to eliminate cough: A case of one-trial learning. *Journal of Behavior Therapy and Experimental Psychiatry*, 1977, *8*, 107–109.

Davis, D. J. NIAID initiatives in allergy research. *Journal of Allergy and Clinical Immunology*, 1972, *49*, 323–328.

Feldman, G. M. The effect of biofeedback training on respiratory resistance of asthmatic children. *Psychosomatic Medicine*, 1976, *38*, 27–34.

Figures on expense per patient day (section on Hospital Statistics, Statistical Tables).. *Journal of the American Hospital Association*, 1971, *45*, 462.

National Center for Health Statistics. Chronic conditions and limitations of activity and mobility in the United States, July 1965–July 1967. *Vital and Health Statistics*, 1971, Series 10, No. 61.

Neisworth, J. T., & Moore, F. Operant treatment of asthmatic responding with the parent as therapist. *Behavior Therapy*, 1972, *3*, 95–101.

Renne, C., & Creer, T. L. The effects of training on the use of inhalation therapy equipment by children with asthma. *Journal of Applied Behavior Analysis*, 1976, *9*, 1–11.

Schiffer, C. G., & Hunt, E. P. *Illness among children: Data from U.S. National Health Survey* (Children's Bureau Publication No. 405). Washington, D.C.: U.S. Government Printing Office, 1963.

Segal, M. S. Death in bronchial asthma. In E. B. Weiss & M. S. Segal (Eds.), *Bronchial asthma: Mechanisms and therapeutics*. Boston: Little, Brown, 1976.

Tal, A., & Miklich, D. R. Emotionally induced decreases in pulmonary flow rates in asthmatic children. *Psychosomatic Medicine*, 1976, *38*, 190–200.

Vachon, L., & Rich, E. S. Visceral learning in asthma. *Psychosomatic Medicine*, 1976, *38*, 122–130.

Sleep, Sleep Disorders, and Some Behavioral Approaches to Treatment of Insomnia

PAM HYDE AND VERNON PEGRAM

NORMAL SLEEP MECHANISMS

One would think that sleep is a behavior in the sleep–wake cycle that occurs naturally and effortlessly. Yet a growing number of people find themselves out of synchronization with their natural rhythm of sleeping and waking. According to some estimates, from 20 to 50 million persons in the United States alone (10–25% of the population) subjectively suffer from too much wakefulness (Goldberg & Kaufman, 1978). Excessive daytime sleepiness is also a serious problem for well over 100,000 Americans (Guilleminault, Carskadon, & Dement, 1974). With such a large proportion of the population suffering from sleep–arousal disorders, the recent emphasis in the development of effective nonpharmacological treatments for insomnia becomes more easily understood given the limitations of the present drug therapies.

Sleep Stages

Sleep usually occurs as a natural component of one's 24-hour circadian cycle. Behaviorally, we associated the state of sleep with decreased

PAM HYDE • Neurosciences Program, University of Alabama, Birmingham, Alabama 35294.   VERNON PEGRAM • Neurosciences Program and the Department of Psychiatry, University of Alabama, Birmingham, Alabama 35294.

motor activity, gross reduction in general muscle tonus, eyelid closure, and a general reduction in reactivity to stimulation; yet sleep should not be thought of as a passive state of the brain and body. A more detailed consideration of the sleep–wakefulness cycle reveals that mammalian sleep behavior involves three distinct, readily identifiable behavioral states. These states are wakefulness, slow-wave non-rapid eye movement (NREM) sleep, and rapid eye movement (REM) sleep (Dement, Mitler, & Zarcone, 1973). If the fragile balance of these three behavioral states is altered by environmental changes, pharmacological agents, or physical disease, a person begins to report the result of the fluctuations in terms that are called symptoms of sleep disorders. Reports range from too much wakefulness to too much sleepiness, representing an imbalance of the sensitive sleep–wakefulness cycle.

Sleep–Wakefulness Cycle

Much of the knowledge of the sleep–wake cycle comes from recent research in sleep laboratories, even though the first report of extensive electroencephalograms (EEGs) of the brain's electrical activity came from Hans Berger as early as 1929 (Mendelson, Gillin, & Wyatt, 1977). About 40 years ago, Loomis and his associates (Loomis, Harvey, & Hobart, 1937) demonstrated that the human EEG could be subdivided into a series of discontinuous stages dependent on frequency and voltage criteria. Generally, the successive series of changes in the sleep cycle begin as the 8- to 14-Hz "alpha" waves, which characterize the resting stage of wakefulness, begin to give way to irregular, low-voltage activity associated with the drowsy state, or stage 1. There soon follow bursts of "spindle" activity at about 12–14 Hz, which characterizes stage 2. Finally, high-amplitude, very slow "delta" (0.5–2.0 Hz) waves occur. The respective percentage of delta waves is the determinant as to whether the epoch is classified stage 3 or stage 4. Stages 3 and 4 are collectively called slow-wave sleep. Stages 1, 2, 3, and 4 are collectively called non–rapid eye movement (NREM) sleep.

The most recently reported stage—rapid eye movement (REM) sleep—was the subject of reports by Aserinsky and Kleitman (1953) and by Dement and Kleitman (1957). In adults, REM sleep is most likely to occur after the slow-wave sleep has continued for 70–90 minutes. The EEG abruptly changes to a low-voltage, mixed-frequency pattern that paradoxically resembles alertness. Also during this REM stage of sleep, the subject is most likely to report dreaming (Dement & Kleitman, 1957). Rapid eye movement sleep is further characterized by a reduction in tonus in some skeletal muscle groups. In the normal adult human sleep pattern, REM and NREM sleep alternate with approximately 90-minute periodicity throughout the night (Figure 1). During the night, the first REM periods tend to be more brief (5–15 minutes), whereas later REM
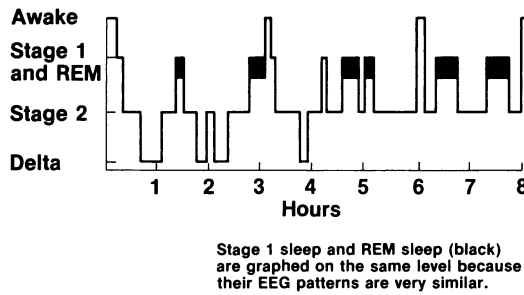
Figure 1. Typical sleep pattern of a young human adult. Stage 1 sleep and REM sleep (black) are graphed on the same level because their EEG patterns are very similar. (*The Sleep Disorders*, P. Hauri, 1977.)

periods may last 20–40 minutes; thus most REM sleep occurs in the last third of the night.

For further information on the development of sleep research, the reader is directed to historical reviews written by some of the persons who were intimately involved in its evolution (Dement & Mitler, 1974; Jouvet, 1969; Kleitman, 1963).

Effects of Age on Sleep

Even though most of the human sleep data have come from young adults, increasing numbers of studies reveal that the EEG wave forms and patterns of sleep change with age. For example, the sleep cycle of the infant is about 50 minutes, as compared to the 90–100 minute adult cycle (Roffwarg, Dement, & Fisher, 1964). As a person ages, there is a decrease in amount of slow-wave sleep (stages 3 and 4); but REM sleep remains relatively constant after it stabilizes at puberty, somewhere near 20–25% of total recording time in the laboratory. The decrease in stages 3 and 4 becomes evident in the mid–adult years and continues to decrease with age (Agnew, Webb, & Williams, 1967; Feinberg, Koresko, & Heller, 1967). For comparison, Figure 2 depicts the normative data for 20- to 29-year-old females versus 60- to 69-year-old females (Williams, Karacan, & Hursch, 1974).

Sleep disturbances in the elderly have become a specialized focus of sleep research in recent years. The complaint of insomnia by elderly people is perceived as one of their more common problems. However, due to the subjective nature of insomnia, this is an area of sleep research that medical research and clinical practice have understood the least. As previously mentioned, sleep researchers have found that many changes in the sleep–wakefulness cycle do occur with age. There is a need to determine clearly which changes in sleep patterns are natural, immutable, and inevitable with age and might best be endured rather than intensively battled.
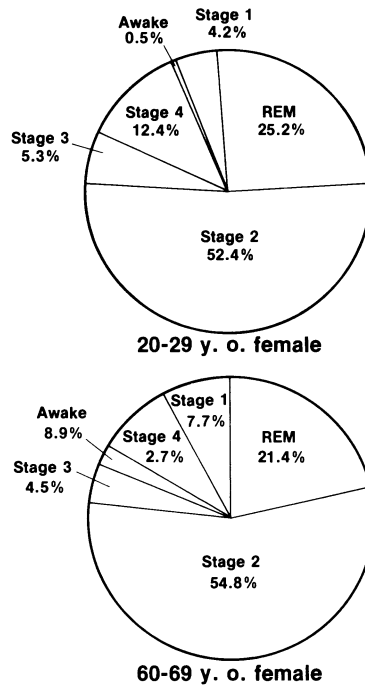
Figure 2. Percentage of each sleep stage. (A) 20- to 29-year-old females; (B) 60- to 69-year-old females. (*EEG of Human Sleep: Clinical Applications*, R. L Williams, I. Karacan, & C. Hursch, 1974.)

INTRODUCTION TO DISORDERED SLEEP MECHANISMS: NOSOLOGICAL CONSIDERATIONS

Some disorders of sleep are so mild that patients scarcely even bother to communicate the symptoms to their physicians. Other disorders are rarely encountered in the lifetime of a health professional. The most commonly heard complaint is that of insomnia; however, current literature also suggests increased attention to the hypersomnias.

For clarification, the terms *insomnia* and *hypersomnia* should be defined as they will be used throughout this chapter. Insomnia is defined as a chronic inability to obtain the amount of sleep that seems necessary for efficient daytime functioning. Hauri (1977) states that insomnia is not a term that can be defined in terms of absolute hours because of the variability of individual sleep needs. More likely, the patient will report feeling very poorly due to (1) inability to go to sleep, (2) inability to stay asleep, and/or (3) early awakening and inability to go back to sleep. Currently, the phrase *excessive daytime sleepiness* (EDS) has begun to replace the term hypersomnia. Persons suffering from EDS might not actu-

ally sleep much longer than normal individuals in a 24-hour period; the problem, however, centers around the feeling of chronic daytime sleepiness, regardless of how many hours the patient sleeps at night.

The classification of sleep disorders has changed as a result of the increasing accumulation of both basic and applied knowledge about sleep. The Association for the Psychophysiological Study of Sleep has facilitated sleep research conducted at university-based sleep disorder centers. A group of these centers joined to form the Association of Sleep Disorders Centers (ASDC) in October 1975. Among the many specific aims of the association was the development of standards and procedures for polysomnography, defined as the multidimensional evaluation of a patient during sleep. Another goal was the systematic classification of sleep disorders in a manner closely relating to the chief complaints heard by primary-care physicians. Their proposed classification divides the disorders into four major categories: (1) disorders of initiating and maintaining sleep (the insomnias); (2) disorders of excessive somnolence (3) dyssomnias associated with disruptions of the 24-hour sleep–wake cycle; and (4) dysfunctions associated with sleep, sleep stages, or partial arousal (parasomnias). Each major category can be further subdivided according to the nature of the etiology of the disorder—for example, psychophysiological disturbances, psychiatric disturbances, use of drugs and alcohol sleep-induced ventilatory impairment, other medical conditions, and behaviorally conditioned sleep disorders (Institute of Medicine, 1979).

It becomes increasingly clear that the successful treatment of a specific sleep–arousal disorder can require many health-related disciplines working together, each contributing skills to the management of the whole person who is suffering from sleep–arousal disorders. The most efficacious treatment protocol for certain sleep–arousal disorders requires the alliance of the medical model and the psychological-behavioral model. However, certain sleep–arousal disorder symptoms currently seem to improve with an emphasis on the medical model approach (e.g. narcolepsy, sleep apneas, nocturnal myoclonus, nonrestorative sleep, and "pseudoinsomnia" (Hauri, 1977).

PRIMARY SLEEP DISORDERS

Despite the considerable growth of information relating to sleep and sleep disorders, historically there has been little systematic or practical instruction in the diagnosis and treatment of primary sleep disorders; therefore, the following is a brief review of a group of clinically distinct, primary sleep disorders that have received considerable attention in the recent literature. These disorders include narcolepsy, the sleep apneas, nocturnal myoclonus, and "restless legs."

Narcolepsy

Approximately 60–70% of the patients presenting with excessive daytime sleepiness (EDS) have narcolepsy. The participants at the First International Symposium on Narcolepsy defined narcolepsy as a syndrome that is characterized by abnormal sleep tendencies, including EDS and often disturbed nocturnal sleep, and pathological manifestations of REM sleep. The most typical REM sleep manifestations are cataplexy and sleep onset REM periods (SOREMP), but sleep paralysis and hypnagogic hallucinations may also be present. Only about 10% of narcolepsy patients experience all four manifestations of the disorder.

The manifestations of EDS include inappropriate and irresistible sleep episodes, amnesiac periods, and often severe drowsiness. Narcoleptics do not necessarily sleep more than normal individuals. Their problem is principally the uncontrollable nature of their sleepiness. Excessive daytime sleepiness is usually the earliest manifestation of narcolepsy. The onset of symptoms usually occurs between the teen years and the third decade of life; EDS tends to worsen over time, often resulting in social and economic embarrassment.

When the narcoleptic tetrad was described, cataplexy was reported to occur in about $\frac{2}{3}$ of the patients. More recently, it has been found that 95% of patients who are polygraphically diagnosed as having narcolepsy with SOREMPs also experience cataplectic attacks (Guilleminault, 1976). Cataplexy is a sudden and reversible loss of skeletal muscle tonus lasting from a few seconds to 30 minutes. The most frequently affected muscles are those of the jaw, neck, and knees; the attack may range in severity from a slight feeling of weakness to involvement of the entire voluntary musculature. Extraocular muscles are usually uninvolved and the patient usually continues to breathe. The patients are apparently awake during the episodes and are aware of their surroundings. The frequency of the cataplectic attack in patients with narcolepsy–cataplexy is usually between one and four episodes daily but can vary widely. The attacks are most often triggered by strong emotions or exercise. Consequently, the patients learn to impose restrictions on their activities or emotions. The occurrence of hypnagogic hallucinations and sleep paralysis in the narcoleptic syndrome has been estimated to range from 20 to 50% and from 14 to 57% of the patients, respectively (Karacan, Moore, & Williams, 1979).

A patient presenting with the chief complaint of EDS who also has a history of cataplexy is strongly suspected to have narcolepsy. A definitive diagnosis can be made with a multiple sleep latency (MSL) determination done in a sleep laboratory. The MSL determination has become routine in the diagnosis of narcolepsy on the basis of the suggestion that sleep latency measured repeatedly in controlled nap situations might prove a useful tool in evaluating pathological sleepiness. Sleep latency can be defined as the time between the point when an individual tries to sleep

and the point when electroencephalographic patterns of sleep first develop. The multiple-nap procedure revealed that narcoleptics consistently fall asleep more readily than control subjects (Richardson, Carskadon, Flagg, Van Den Hoed, Dement, & Mitler, 1978). The MSL study must be conducted after the patient has been free of stimulant medication, hypnotics, alcohol, and psychotropic medication for at least 2 weeks.

Sleep Apnea Syndromes

Sleep apnea, whether it produces the complaint of EDS or insomnia, is a serious and sometimes life-threatening disorder. Researchers in the last few years have demonstrated that patients with the condition can have acute pulmonary artery hypertension during apneic episodes, which can lead to right ventricular hypertrophy and cardiac complications.

Sleep apnea has been recognized and studied for approximately a decade. These studies have been well described in *Sleep Apnea Syndromes* (Guilleminault & Dement, 1978). There are a number of important clinical subtypes of the sleep apnea syndromes. These include upper airway obstructive sleep apnea, central sleep apnea, mixed apnea, the Pickwickian syndrome, and the sudden infant death syndrome. Sleep apnea can appear from infancy to old age but it usually seen in males over 40 years of age.

Clinically, sleep apnea patients report a variety of symptoms that might attract attention when all are present but that can lead to diagnostic errors when only one or two are seen. Snoring is an important clue. The characteristic loud, pharyngeal snoring, interspersed with snorting, appears as the first clinical symptom in most patients, sometimes as early as age 6 or 7. The continuous snoring pattern will be interrupted by apneic periods as many as several hundred times a night. These apneic episodes usually last 20–180 seconds or longer. Accompanying the apneic episodes are abnormal movements ranging from small movements of the hands or feet to large flailing movements involving the entire upper and lower limbs. If the patient is awakened suddenly during the night, he or she can appear confused and disoriented. The second most common symptom is excessive daytime sleepiness. Daytime drowsiness may be so severe that patients fall asleep while eating, but it is especially common in monotonous situations such as driving, attending meetings, reading, or watching television. Personality changes with reactive depression, abnormal outbursts of emotion, episodes of jealousy and suspicion, irrational behavior, and sudden impotence are also symptoms that may develop secondarily to the sleep apnea syndrome.

Of the sleep apneic patients seen at the Stanford Sleep Disorders Clinic, 94% were male. Such a significantly different incidence between men and women indicates that the sleep apnea is essentially a male syndrome.

The definitive diagnostic test for sleep apnea syndrome is the all-night polysomnogram. Polysomnography is a complex evaluation of a patient during sleep that involves assessment of the central nervous system. In the case of sleep apnea, polysomnography would include assessment of respiratory and cardiac function with the use of an ear oximeter, electrocardiograph, and blood gas analysis in addition to the standard EEG measurements. It is essential to determine which subtype of sleep apnea the patient has because the treatment varies accordingly.

Nocturnal Myoclonus

Patients with this condition have pronounced jerks in both legs simultaneously, with a tendency for flexion to occur at the ankle, knee, and hip. If the jerking is pronounced enough, it will arouse the patient. The leg movements are confined to sleep and are generally not seen in arousal. The myoclonic jerks last from 1.5 to 3 or 4 seconds. Patients typically have several hundred movement episodes during the night, most occurring in NREM rather than REM sleep. Patients usually complain of frequent arousals during the night and often of aching leg muscles. They are often chronically fatigued and can have symptoms of depression.

The physician can establish whether nocturnal myoclonus is related to complaints of insomnia by a direct line of questioning concerning twitching in the patient's legs while asleep or falling asleep. Enquiry should be made concerning whether the patient is aroused by the twitching.

Restless Legs Syndrome

The syndrome of nocturnal myoclonus frequently coexists with "restless legs" syndrome, although the latter can occur independently. This syndrome is so bizarre that patients often have difficulty describing the problem. Usually they say they feel as if there is something crawling inside their legs. This sensation occurs during the day perhaps every hour or two, as well as during sleep. Moving about banishes the symptom. At night, patients must get out of bed and walk around before they can go back to sleep. The effects of this problem, as with the sleep apneas, are a sleep pattern with a marked reduction of delta (or deep) sleep and feeling of being chronically tired and sleepy during the day.

INSOMNIAS

Of all the problems and complaints associated with sleep, disorders of initiating and maintaining sleep (the insomnias) are by far the most

commonly reported. A survey conducted by the Stanford University Sleep Disorders Center (National Academy of Sciences, 1979) show that 38% of the 6,352 respondents claimed to have a sleep problem. In a nonrandom survey of more than a million people, 13% of the men and 26% of the women over age 30 complained of insomnia (Hammond, 1964). In a 1970–1971 national probability sample survey of the United States population, 11% of the men and 17% of the women interviewed reported having a significant problem with insomnia. An additional 19% of the total sample reported sleep problems of a minor nature (Baxter & Bauer, 1975). It appears that about a third of the adult population in the United States, or about 50 million people, would report some sleep disturbance in a given year (Institute of Medicine, 1979). There are many causes for these subjective complaints of insomnia, including physical or psychiatric illness, environmental stress or life crisis events, and the use or withdrawal of various psychoactive drugs. As with many other types of subjective distress, much ignorance surrounds the nature of the problem and the value of the relief commonly provided in modern health care.

Most health care professionals have assumed that patients who complain of insomnia accurately describe their nighttime sleep. But in treating a patient who complains, for example, that he or she requires one hour to fall asleep, one must remember (a) that the patient likely falls asleep considerably more quickly, (b) that under the best of circumstances, a hypnotic will probably shorten the objective sleep latency by only 10–20 minutes, and (c) that although the patient's estimate of the difficulty might be exaggerated, his or her subjective distress is real.

Among the several different types of insomnia, the following discussion places special emphasis on those insomnias that might possibly respond to a management program with a psychological emphasis.

Transient and Situational Insomnia

Acute insomnia can arise from a number of sudden changes in life, such as medical, surgical, or traumatic conditions; admission to a hospital or sleeping in any new environment; personal stress and anxiety, as in bereavement or such disturbances of biological rhythms as "jet lag" or shift work. Acute forms of insomnia usually respond to the passage of time, patient education, or the judicious use of hypnotics.

Insomnia Associated with Psychological Disorders

Psychological symptoms—varying degrees of depression, anxiety, concern about physical well-being, and "nervousness"—are common in insomniac patients. Hauri (1977) states even with all the new research on sleep disorders, emotional and psychiatric problems still lie at the roots of many sleep disturbances like insomnia.

Insomnia Associated with Drugs and Alcohol

Pharmacological factors must always be evaluated in the patient with insomnia. Dependence on, tolerance to, and withdrawal from hypnotic agents themselves may be major factors in the complaints of some insomniac patients. Alcohol is a particular issue in insomnia because it is the most commonly used self-medication for insomnia. Generally, alcohol initiates a prompt sleep onset, but in excess or on a chronic basis it also disrupts and fragments the normal sleep pattern.

Insomnia Associated with Medical Disorders

A thorough medical history, physical examination, and appropriate laboratory examinations must be included in the evaluation of the chronic insomniac patient. Insomnia is rarely the presenting chief complaint of a medical disorder. Coexisting medical conditions and treatments must be considered while planning treatment for other types of insomnia. Hepatic or renal insufficiency, for example, may predispose certain patients to toxic reactions when taking hypnotics. When medical disorders appear to cause insomnia, treatment should be directed toward the medical condition rather than treating the sleep problem symptomatically.

Insomnia Associated with Sleep-Induced Ventilatory Impairment

As was discussed under the sleep apnea syndromes, unsatisfactory nocturnal sleep can be a complaint of a person with sleep apnea. The routine administration of hypnotic drugs to patients presenting with insomnia as a result of sleep apnea can be fatal. Many hypnotics have been shown to produce obvious central nervous system depression (Elliott, Navarro, Kokka, & Nomof, 1975), thus putting sleep apnea patients at greater risk.

Insomnia Associated with Nocturnal Myoclonus or Restless Legs Syndrome

These closely associated syndromes, previously discussed, present clinically as a person who cannot maintain sleep and suffers from brief arousals throughout the night.

Idiopathic Insomnia

In the nosology of the Association of Sleep Disorders Centers, the diagnosis of "persistent, psychophysiological disorders of initiating sleep" describes the "primary insomniacs." This concept is controversial

and is likely to change with future research. Presently, it refers to insomnia for which no major cause can be found at this time. Although these patients are often psychologically distressed, they do not meet the diagnostic criteria of a primary psychiatric illness. Often these patients insist that insomnia is their main problem and that their subjective psychological distress is secondary, but Kales, Caldwell, Preston, Healey, and Kales (1976) believe that psychological problems are the main factor despite a patient's claim to the contrary.

Insomnia Associated with the Aging Process

There is uncertainty about the incidence of sleep complaints in the elderly; there is, however, no question that the elderly, due to their age-related physical problems, consume a disproportionate amount of various medications. Of the hypnotics prescribed in 1977, 39% were for persons over the age of 60 years, who constitute only 15% of the population and account for approximately 11% of all office visits (Institute of Medicine, 1979).

The elderly are more vulnerable to the hazards of hypnotic use because they are more likely to have disorders aggravated by hypnotics such as impaired respiratory, hepatic, or renal function. The elderly are also more likely to be taking other medications, leaving them at increased risk for toxic interactions from the consumption of several different drugs at the same time.

Although the medical profession is often blamed for "pushing pills," the elderly often seek and prefer chemical solutions to their ills and will medicate themselves. When the promised result is not achieved, the tendency is to use more drugs (Henning, 1975). Schwartz, Wang, Leitz, and Goss (1962) state that socioeconomic factors also play an important role in drug-taking behavior of the elderly. Difficulty in living on fixed incomes motivates them to turn to over-the-counter preparations and home remedies to avoid the cost of a doctor's visit. Fear, ignorance, or lack of transportation often contribute to potential overuse or misuse of drugs by the elderly. Complicating the problem is a lack of specified geriatric drug doses. Existing experimental data on drug metabolism are usually obtained from adults in their mid-20s (Garrod, 1974). The few studies available show no particular hypnotic agent to be more effective that another.

Sleep disturbances represent a difficult problem for the elderly person, for his or her family, and for the health care professional. Before prescribing a hypnotic for an elderly person, certain nonpharmacological measures should be suggested, such as establishing a ritual for retiring to bed, avoiding daytime naps, and increasing the amount of physical activity.

Nonpharmacological techniques for the management of insomnia in the elderly are discussed at length by Butler and Lewis (1977). It is especially important to be aware of the tendency of the elderly to find their

daytime hours unusually conducive to sleep. It is this pattern of daytime sleep that must be changed instead of treating the nighttime insomnia that results from it. Most important in devising new daytime schedules with set times for rising and exercise is the assistance of those persons found in the elderly person's natural association of people—family, friends, and neighborhood social networks. There is a body of research to suggest that social supports have a direct effect on health by mediating the impact of stress and by strengthening the individual's coping efforts (Hamburg, Adams, & Brodie, 1976).

The National Institute on Aging, along with the National Academy of Sciences and the Association of Sleep Disorders Centers, has mounted an effort to deal with the specialized problem of sleep disturbances in the elderly. A vigorous program of professional medical education and continuing medical education is aimed at diminishing the inappropriate prescribing of hypnotic drugs, especially to the elderly. Another recommendation suggests exploring the greater utilization of all health care professionals and paraprofessional persons in the nonpharmacological management of insomnia.

Behavioral Insomnia

Many persistent insomnias seem to be essentially learned habits of poor sleep with two factors playing important roles: (1) conditioning and (2) internal arousal. In conditioned insomnia, the stimuli and rituals surrounding sleep have preceded poor sleep so many times that they, themselves, can now trigger frustration and insomnia. In internal arousal insomnia, the patient's desperation to sleep causes an increased arousal and an inability to relax, thus leading to insomnia.

Behavioral insomnia most often begins as a response when a person experiences excessive stimulation or stress. Hauri (1979) lists four critical factors that can possibly combine to create the chronic aspect of behavioral insomnia:

1. *Trying too hard.* Trying to will oneself to sleep usually only increases arousal. Maladaptive conditioning begins to occur.
2. *Conditioned wakefulness.* As a person's hyperalertness results in insomnia during an initial stress, the bedroom environment can gradually become associated with the frustration of arousal.
3. *Disruption of sleep–wake rhythm.* The insomniac often oversleeps in the morning and frequently takes daytime naps. Over a period of time, the natural sleep–wake rhythm is lost to a pattern of disrupted sleep spread over the 24-hour day.
4. *Fear of insomnia.* Self-labeling as insomniac is part of a self-fulfilling prophecy system. Thus, a poor night's sleep reconfirms the label.

Hauri (1979) concludes that in sound sleepers the normal extinction of unreinforced behavior gradually overcomes the poor sleep habits learned

during a life crisis. But, in the case of a person with a tenuous sleep cycle before a crisis, the naturally occurring occasional nights of poor sleep reinforce the learned disruptive pattern and prevent the poor sleep habits from gradually disappearing.

Insomniacs show more psychopathology than do good sleepers (Hauri, 1979; Kales et al., 1976), especially when measured on a psychometric test like the Minnesota Multiphasic Personality Inventory (MMPI). Insomniacs studied by Kales, Caldwell, Bixler, Healey, Kales, and Preston (1978), when compared to controls, showed a significantly higher mean value on all eight of the major MMPI scales except hypomania (MA). The MMPI scales that were most frequently among the three highest in the insomniac patients were depression (D) (61.7%), hysteria (HY) (48.7%), and psychasthenia (PT) (41.8%). Further, Beutler, Karacan, Thornby, and Salis (1978) found that the absolute amount of sleep latency is positively related to the development of hysterical characteristics and that the frequency of nocturnal awakenings is positively related to evaluation in the MMPI frequency (F) scale and the schizophrenia (Sc) scale. They suggested that sleep maintenance is more closely associated with the more severe types of psychopathology, whereas sleep latency is more closely related to anxiety and neurotic conditions.

The pattern of poor sleep seems to aggravate psychological problems in a cyclic manner. The interaction of the heightened physiological arousal, psychopathology, and insomnia is one of mutual reinforcement. Hauri (1979) states that if the clinician can interrupt this cycle at any one point—for example, if physiological arousal could be decreased by relaxation training or if the psychological problems could be lessened through therapy—the disrupted sleep–arousal system would benefit.

With behavioral factors playing a role in many sleep–arousal disorders, Hauri (1977) states that the bulk of insomnias seem to be related to behavioral problems. In addition, he states that these behavioral insomnias, being essentially based on faulty learning, are particularly resistant to pharmacological or psychotherapeutic treatment. In the case of conditioned insomnia, an efficacious treatment might be a procedure called "stimulus control behavior therapy" by its originator, Bootzin (1973). The goal of this behavior therapy is to associate the bedroom with rapid sleep onset; after a reconditioning period Bootzin reports approximately a 60% success rate in a random sample of insomniacs not necessarily selected as conditioned insomniacs.

PHARMACOLOGICAL AND PRACTICAL TREATMENTS OF INSOMNIA

Sleep researchers have raised important questions regarding the effectiveness of pharmacological agents used to promote "better sleep." Increasingly, we find insomniacs who chronically ingest large doses of

sleeping medications yet subjectively report suffering even more sleep difficulties. The cyclic nature of this phenomenon can be readily seen in Figure 3. Kales and Kales (1973) reported that with chronic administration most hypnotics they studied lost their efficacy within a 2-week period. In addition, research shows hypnotics to produce intrasleep alterations that are characterized by marked decreases in REM and slow-wave sleep (Kales & Kales, 1973; Kales, Bixler, Tan, Scharf, & Kales, 1974; Karacan & Williams, 1971; Oswald, Berger, Jaramillo, Keddie, Alley, & Plunkett, 1963).

Withdrawal from hypnotic drugs, from a psychological perspective, is sometimes made increasingly difficult because of attributional effects accompanying the use of such drugs (Ribordy & Denney, 1977). What sleep the insomniac does obtain is likely to be attributed to the drug rather than to his or her natural propensity for a certain amount of sleep during the sleep–wake cycle of the day.

There are cases, however, when a hypnotic agent is appropriate. These include transient situational insomnias in which it is understood by both patient and doctor that medication is being used only for a brief period of time. Periods of sleep difficulty associated with hospitalization and surgery or other clearly defined medical conditions are also good reasons for short-term use of hypnotics. Although the studies relating to hypnotic efficacy are often contradictory, the general belief is that most sedative and hypnotic drugs do not retain their sleep-inducing effectiveness for more than a few nights.

On the market today there are probably a hundred nonprescription products that are claimed to be of benefit for insomnia or anxiety. It is estimated that 30 million packages of over-the-counter hypnotics are purchased annually by Americans (National Academy of Sciences, 1979). Findings from the few clinical studies are contradictory (Sunshine,
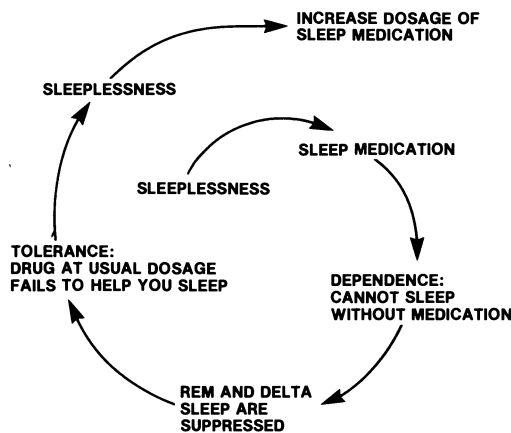
Figure 3. Cyclic nature of the use of sleeping medications. (*How to Sleep Better: A Drug Free Program for Overcoming Insomnia*, T. Coates and C. Thoresen, 1977.)

Zighelboim, & Laska, 1978; Teutsch, Mahler, & Brown, 1975). However, the only study monitoring sleep electrophysiologically revealed no beneficial effects of methapyrilene and scopolamine when compared to placebo (Kales, Tan, Swearingen, & Kales, 1971).

Pharmacological factors must always be evaluated in the patient with insomnia. Dependence on, tolerance to, and withdrawal from hypnotic agents can, themselves, be major factors in the complaints of some insomniac patients withdrawing from hypnotic treatment (Kales *et al.*, 1974). Some of these patients appear to improve once they have ended their dependence on hypnotics. When multiple doses have been taken, these drugs should be withdrawn slowly under medical supervision in view of the dangers of major withdrawal symptoms, including convulsions.

As noted in the above discussion, insomnia is a symptom resulting from multiple, simultaneous causes. The first step in treating insomnia is a careful medical and psychiatric evaluation. when the differential diagnosis of insomnia is not clear on the basis of a clinical evaluation, several nights of sleep in a sleep laboratory might be recommended to obtain more objective data to supplement the presenting clinical picture. Whenever possible, treatment of insomnia should be directed at specific illnesses or underlying causes. Thus, the treatment plan, varying from person to person, will sometimes simply include psychological support, a change in life patterns, or behavior therapy. All of these therapies have the commonality of being nonpharmacological in nature. Sometimes treatment will be aimed at a specific medical condition that concomitantly causes pain or discomfort. Overall, in a great majority of instances, insomnia is best treated without medication. When medication is required, it will frequently be an antidepressant, antipsychotic, or other medication intended to treat specific underlying conditions rather than a hypnotic aimed at the symptom of inability to sleep.

In terms of recommendations that can be offered in practical management, it is often useful for some patients to establish (1) rigid times of going to bed and arising, (b) no daytime naps, (c) the notion that the bed is a place for sleep (and sexual activity) but not for wakefulness, reading, eating, watching television, worrying, letter writing, or any other activity, (d) the expectation that if the patient cannot go to sleep or cannot return to sleep on awakening, he will get out of bed and occupy himself until ready to return to sleep, (e) a program of daytime exercise, which tends to promote nocturnal sleep, (f) evening activities conducive to relaxation, including hobbies, rest, hot baths, warm milk, and so forth.

The cyclic nature of insomnia, when viewed with the arousal–anxiety etiological base theory, has led many investigators to believe that behavior therapies originally derived for the reduction of anxiety might be applicable to some sleep–arousal disorders in the category of behavioral insomnia or conditioned insomnia. Ribordy and Denney (1977) and Haynes, Follingstad, and McGowan (1974) propose that the rationale

for the use of many of the behavioral treatments for insomnia rests soundly upon the view that insomnia results from heightened physiological arousal both before and during sleep. This approach is supported by Monroe's (1967) study, in which he used various physiological measures to ascertain that the sleep of the insomniac is nearer the waking end of the sleep–wakefulness continuum when compared to normal sleepers. One common similarity or basic therapeutic factor in each of these behavioral treatment modalities is anxiety reduction (Montgomery, Perkin, & Wise, 1975).

BEHAVIORAL TREATMENTS OF INSOMNIA

Shifting the emphasis of the treatment protocol from the medical model to the behavioral management approach seems to be the most efficacious procedure for certain sleep–arousal disorders—that is, sleep disorders secondary to some types of psychiatric problems, conditioned or behavioral insomnia, internal arousal, disturbance of the sleep–wake rhythm, sleep phobias, and the psychological aspects of narcolepsy and sleep apnea.

A variety of behavioral treatments for insomnia have been proposed, evaluated, and reviewed (Hauri, 1979; Knapp, Downs, & Alperson, 1976; Montgomery *et al.*, 1975; Regestein, 1979; Ribordy & Denney, 1977; Shealy, 1979; Turner, 1977). The reader is referred to these review articles for a thorough examination of a rapidly growing area in the behavior therapy literature.

Sleep Diary and Polysomnograms

A critical part of any behavioral treatment involves patients completing a daily log of their sleep pattern and drug intake for at least 2 weeks prior to treatment. This baseline data provides the clinician with a specific pattern regarding the sleep–wake cycle of the patient. There are several additional reasons for the documentation of the pretreatment data. First, the activity of self-observation may increase the patient's awareness of the specific problem so that the process can be therapeutic in itself (Jason, 1975; Johnson & White, 1971). Second, as Hauri (1979) states, persons who are unwilling to log their sleep for a few weeks before treatment starts are rarely willing to carry through behavioral training. Finally, patients can bolster their enthusiasm for changing their sleep behavior during times when small gains are being logged if they have pretreatment data. Considering its simplicity, the use of a sleep diary can be one of the most useful means of assessment and treatment with problem cases.

Many times the all-night polysomnogram provides a means for be-

havioral intervention as well as a basis for obtaining objective sleep data. In a number of cases, especially with the elderly, the nighttime sleep data has shown that their sleep was well within age-related norms. Often this knowledge can go far toward comforting the patient and breaking the sleep loss and anxiety cycle.

Relaxation

The first systematic use of muscle relaxation in the control of insomnia was reported by Jacobson (1938). The progressive relaxation of specific muscle groups by alternately tensing and relaxing them forms the basic framework of the most commonly used form of relaxation training. Ultimately, the goal of the subject is to learn to achieve low levels of general muscle tension at will. Deep muscle relaxation training can be accomplished by other techniques such as self-hypnotic induction, autogenic training, and EMG (electromyogram) biofeedback. These variations of relaxation training have been used in the treatment of insomnia by a number of researchers (Borkovec & Fowles, 1973; Haynes, Woodward, Moran, & Alexander, 1974; Kahn, Baker, & Weiss, 1968; Nicassio & Bootzin, 1974; Paul, 1969; Wolpe, 1969). For example, Kahn et al. (1968) used autogenic training in an applied relaxation treatment of insomnia. Autogenic training, developed by Schultz and Luthe (1959), involves instructing patients to visualize peaceful scenes and to repeat relaxing phrases of warmth and heaviness over a period of weeks or even months (e.g., "I am at peace" or "My right arm is heavy"). After patients practiced these autogenic phrases, sleep onset latencies were remarkably reduced.

Numerous methodological errors plagued many of the studies using this treatment procedure. However, these studies seem to have employed acceptable methodological procedures in examining the efficacy of applied relaxation in treating insomnia (Borkovec & Fowles, 1973; Nicassio & Bootzin, 1974; Shealy, 1979). These studies compared the various techniques for inducing relaxation within the overall framework of treating insomnia by behavioral techniques. In general, the conclusion seems to be that applied relaxation training procedures have been effective in treating insomnia. Shealy (1979) showed that progressive relaxation and stimulus control was more effective than relaxation alone. He noted that many insomniacs reported obsessive thoughts while lying in bed. Thus, the addition of stimulus control, which was more oriented toward easing cognitive stress, probably enhanced the relaxation procedure. Hauri (1979) hypothesized that the efficacy of various forms of relaxation training might be due to the patient's having learned a new way of behaving in the face of sleeplessness. The patient would therefore feel more in control, less helpless, and less likely to commit the error of "trying too hard" to sleep.

Systematic Desensitization

Relaxation training has also been used as a component in systematic desensitization in the treatment of insomnia (Borkovec, Steinmark, & Nau, 1973; Evans & Bond, 1969; Geer & Katkin, 1966; Gershman & Clouser, 1974; Hinkle & Lutker, 1972). Geer and Katkin (1966) reported a case study in which they used four introductory sessions to train a 29-year-old insomniac patient in progressive relaxation and then introduced the systematic desensitization component. They focused on desensitizing the patient to three fear themes, including her inability to fall asleep. After fourteen sessions, the patient's self-report indicated improvement in sleep that was sustained over an 8-month follow-up period. Evans and Bond (1969) found single-item desensitization to attempting to fall asleep was ineffective in treating the insomnia. Several studies have sought to determine the separate contributions of relaxation and desensitization in treating insomnia (Borkovec *et al.*, 1973; Steinmark & Borkovec, 1974).

Most of the studies reported above consistently indicate desensitization to be an effective treatment for insomnia. However, this conclusion is generally based on methodological errors that make it difficult to assess the data. In addition, except possibly in the case of severe insomnia, desensitization appears to be no more effective than the simpler procedure of relaxation training (Ribordy & Denney, 1977).

Classical Conditioning

A treatment plan that offers an alternative to relaxation training and systematic desensitization is the application of classical conditioning principles. This concept is predicated on the hypothesis that insomnia results when the environment in which sleep should occur fails to exert adequate stimulus control over sleeping behaviors.

Stimulus control behavior therapy (Bootzin & Nicassio, 1977) is a demanding treatment approach that requires high motivation on the part of the patient and intensive contact between therapist and patient. Among persons who suffer from behaviorally conditioned insomnia, most will show significant progress in 3–6 weeks of following Bootzin and Nicassio's (1977,) rigid protocol:

1. Attempt to sleep only when you are actually sleepy.
2. Do not use your bed for anything except sleeping. Do not read, watch television, eat, or worry in bed. Sexual activity is the only exception.
3. If you are unable to fall asleep easily, get out of bed and go into another room. Stay up until you feel you can easily fall asleep, then return to your bedroom.
4. If you return to bed and still cannot sleep easily, get up again. Do this as often as is necessary until you finally fall asleep easily.
5. Set your alarm and get up at the same time every morning, regardless of how much sleep you got during the night.

6. Do not nap during the day.
7. Each morning, complete a sleep log; graph the number of times out of bed and the total amount of time spent out of bed.

As in any behavior therapy program, several baseline weeks of sleep logs should be required of the patient. Graphing the progress of improvement is extremely critical in this treatment approach. Assisting the behavioral insomniac in bringing his or her sleeping behavior under tighter stimulus control is the goal of this treatment approach.

Biofeedback

Electromyographic (EMG) biofeedback has been used in applying learning procedures to induce relaxation in treatment of patients with insomnia (Budzynski, 1973; Budzynski, Stoyva, & Adler, 1970; Peper, 1973; Raskin, Johnson, & Rondestvedt, 1973). A criticism of the experimental studies deals with the lack of controls and other methodological errors; thus, there is limited evidence that EMG biofeedback *per se* can be useful in alleviating insomnia. Budzynski (1973) proposed using progressive relaxation and autogenic training in conjunction with EMG biofeedback in order to facilitate the application of relaxation directly to the insomnia.

Hauri's (1978) study found that EMG biofeedback yielded significant improvements in total sleep and sleep latency subjectively, but there was little change in the polysomnographic recordings of the serious insomniac. Electromyographic and theta feedback produced no significant sleep changes except for an increase in REM sleep. Sensorimotor rhythm (SMR) feedback showed improvements in sleep latency both objectively and subjectively; however, SMR feedback is technically difficult to administer. Therefore, if subjective relief from insomnia is the primary purpose, EMG biofeedback seems the most appropriate. Mainly because this type of biofeedback is easily understood by the patient, it has been shown to have positive effects and is easily administered at home.

The general consensus presently seems to indicate that biofeedback and applied relaxation used in conjunction may work with some insomniacs; however, the biofeedback modality (EMG, theta, SMR) must be individually tailored to the particular type of insomnia (Freedman, Hauri, Coursey, & Frankel, 1978). The fact that appropriate biofeedback is more powerful than inappropriate biofeedback underlines the critical need for a careful and accurate etiological diagnosis of the sleep–arousal disorder before the selection of the behavioral treatment (Hauri, 1978).

Paradoxical Intention

There are a significant number of insomniac patients for whom relaxation, biofeedback, or systematic desensitization is ineffective in producing the desired improvement in sleep. Ascher and Efran (1978) have

begun a 10-week behavioral program involving the use of paradoxical intention for sleep onset insomnia that seems resistant to previously tried behavioral techniques. They describe paradoxical intention as a behavioral prescription requiring patients to perform responses that appear to be incompatible with the goal for which they are seeking therapeutic assistance. For example, patients with sleep onset insomnia are instructed to try to remain awake for as long as possible rather than attempt to fall asleep.

The data show a marked reduction in sleep onset latency following the use of paradoxical intention instruction. Ascher and Efran (1978) conclude that the decrease in performance anxiety associated with sleep onset difficulties is a result of the redefinition of the problem situation. Paradoxical intention removes the patient from the cycle of performance anxiety–failure to perform–increased performance anxiety.

Future research might focus on whether this behavioral treatment can be useful with patients complaining of insomnia of varying degrees rather than just the obviously difficult cases used by Ascher and Efran (1978).

SUMMARY

The application of psychological procedures in a multifaceted treatment protocol for any health problem that has traditionally been considered medical in nature presents a refreshing challenge to modern health care professionals. Many physicians will be the first to relate the ineptness of dealing with some of today's major health problems relying solely on current medical practices. It appears that the diagnosis and treatment of sleep disorders has proved to be an excellent behavioral medicine model.

Sleep disorders such as insomnia have been traditionally regarded as nonspecific medical problems related to anxiety or depression and/or transient, stressful life events. The fact that some insomnias might be secondary to psychiatric illness, neurological disorders, hypo- or hyperthyroidism, renal insufficiency, or iatrogenic problems points out the importance of a close liaison between a variety of medical or paramedical specialities. Insomnia is most often not solely a medical or a behavioral disorder but some combination of both physical and psychological factors. It is equally important to recognize the psychological problems that can accompany some of the primary sleep disorders such as narcolepsy or sleep apnea. In these cases, the patient's self-esteem, motivation, work ability, and family interaction can be profoundly affected. Therefore, a thorough assessment and differential diagnosis by the health care professional is crucial in providing the data needed to design a treatment protocol tailored to the needs of the individual patient.

Recent interest in treating insomnia behaviorally when appropriate,

rather than falling into the chronic sleep medication cycle, has led to research evaluating many behavioral procedures. Turner (1977), in a review of various behavioral techniques, reported that there is currently no behavioral treatment of choice for complaints of insomnia. This review showed that treatment involving progressive relaxation, stimulus control, and paradoxical intention differed from placebo and no-treatment groups. However, a recent study by Shealy (1979) concluded that a treatment package using both relaxation and stimulus control appeared to be the most efficacious behavioral treatment for the sleep onset insomniac. In conclusion, a number of behavioral procedures, when combined with the appropriate medical input, offer promise in providing viable alternatives to help people return to a more cycling of their innate sleep–wakefulness patterns.

REFERENCES

Agnew, H. W., Jr., Webb, W. B., & Williams, R. L. Comparison of stage four and 1-REM sleep deprivation. *Perceptual and Motor Skills*, 1967, *24*, 851–853.

Ascher, L. M., & Efran, J. S. Use of paradoxical intention in a behavioral program for sleep onset insomnia. *Journal of Consulting and Clinical Psychology*, 1978, *46*, 547–550.

Aserinsky, E., & Kleitman, N. Regularly occurring periods of eye motility and concomitant phenomena during sleep. *Science*, 1953, *118*, 273–274.

Baxter, M. G., & Bauer, M. L. Patterns of prescribing and use of hypnotic drugs in the United States. In A. D. Clift (Ed.), *Sleep disturbance and hypnotic drug dependence*. New York: Excerpta Medica, 1975.

Beutler, L., Karacan, I., Thornby, J., & Salis, P. J. Personality characteristics in four insomnia subtypes. *Sleep Research*, 1978, *7*, 180.

Bootzin, R. R. Stimulus control treatment of insomnia. *American Psychological Association Proceedings*, 80th Annual Convention, Honolulu, August 1972, 395–396.

Bootzin, R. R., & Nicassio, P. M. Behavioral treatments for insomnia. In M. Hersen, R. Eisler, & P. Miller (Eds.), *Progress in behavior modification* (Vol. 4). New York: Academic Press, 1977.

Borkovec, T. D., & Fowles, D. C. Controlled investigation of the effects of progressive and hypnotic relaxation on insomnia. *Journal of Abnormal Psychology*, 1973, *82*, 153–158.

Borkovec, T. D., Steinmark, S. W., & Nau, S. D. Relaxation training and single item desensitization in the group treatment of insomnia. *Journal of Behavior Therapy and Experimental Psychiatry*, 1973, *4*, 401–403.

Budzynski, T. H. Biofeedback procedures in the clinic. In L. Birk (Ed.), *Seminars in psychiatry* (Vol. 5). New York: Grune & Stratton, 1973.

Budzynski, T. H., Stoyva, J., & Adler, C. Feedback-induced relaxation: Application to tension headache. *Journal of Behavior Therapy and Experimental Psychiatry*, 1970, *1*, 205–211.

Butler, R. N., & Lewis, M. I. *Aging and mental health: Positive psychosocial approaches* (2nd ed.). St. Louis: C. V. Mosby, 1977.

Coates, T. J., & Thoresen, C. E. *How to sleep better: A drug-free program for overcoming insomnia*. Englewood Cliffs, N.J.: Prentice-Hall, 1977.

Dement, W., & Kleitman, N. Cyclic variation in EEG during sleep and their relation to eye movements, body motility and dreaming. *Electroencephalography and Clinical Neurophysiology*, 1957, *9*, 673–690.

Dement, W., & Mitler, M. An introduction to sleep. In O. Petre-Quadens & J. D. Schlag (Eds.), *Basic sleep mechanisms*. New York: Academic Press, 1974.

Dement, W., Mitler, M., & Zarcone, V. Some fundamental considerations in the study of sleep. *Psychosomatics*, 1973, *14*(2), 89–94.

Elliott, H., Navarro, G., Kokka, N., & Nomof, N. Early phase I evaluation of sedatives, hypnotics, or minor tranquilizers. In F. Kagan, T. Harwood, K. Rickels, A. D. Rudzik, & H. Sorer (Eds.), *Hypnotics: Methods of development and evaluation*. New York: Spectrum, 1975.

Evans, D. R., & Bond, I. K. Reciprocal inhibition therapy and classical conditioning in the treatment of insomnia. *Behaviour Research and Therapy*, 1969, *7*, 323–325.

Feinberg, I., Koresko, R. L., & Heller, N. EEG patterns as a function of normal and pathological aging in man. *Journal of Psychiatric Research*, 1967, *5*, 107–144.

Freedman, R., Hauri, P., Coursey, R., & Frankel, B. Behavioral treatment of insomnia: A collaborative study. *Proceedings of Biofeedback Society of America*, 1978, 204–205.

Garrod, J. W. Absorption, metabolism and excretion of drugs in geriatric subjects. *Gerontologia Clinica*, 1974, *16*, 30–42.

Geer, J. H., & Katkin, E. G. Treatment of insomnia using a variant of systematic desensitization: A case report. *Journal of Abnormal Psychology*, 1966, *71*, 161–164.

Gershman, L., & Clouser, R. A. Treating insomnia with relaxation and desensitization in a group setting by an automated approach. *Journal of Behavior Therapy and Experimental Psychiatry*, 1974, *5*, 31–35.

Goldberg, P., & Kaufman, D. *Natural sleep*. Emmaus, Pa.: Rodale Press, 1978.

Guilleminault, C. Cataplexy. In C. Guilleminault, W. C. Dement, & P. Passouant (Eds.), *Narcolepsy: Advances in sleep research* (Vol. 3). New York: Spectrum, 1976.

Guilleminault, C., & Dement, W. C. (Eds.). *Sleep apnea syndromes*. New York: Liss, 1978.

Guilleminault, C., Carskadon, M., & Dement, W. C. On the treatment of rapid eye movement narcolepsy. *Archives of Neurology*, 1974, *30*, 90–93.

Hamburg, D. A., Adams, J. E., & Brodie, H. K. H. Coping behaviors in stressful circumstances: Some implications for social psychiatry. In B. H. Kaplan, R. N. Wilson, & A. H. Leighton (Eds.), *Further explorations in social psychiatry*. New York: Basic Books, 1976.

Hammond, E. C. Some preliminary findings on physical complaints from a prospective study of 1,064,004 men and women. *American Journal of Public Health*, 1964, *54*, 11–23.

Hauri, P. *The sleep disorders*. Kalamazoo, Mich.: Upjohn Company, 1977.

Hauri, P. Biofeedback techniques in the treatment of chronic insomnia. In R. Williams & I. Karacan (Eds.), *Sleep disorders: Diagnosis and treatment*. New York: Wiley, 1978.

Hauri, P. Behavioral treatment of insomnia. *Medical Times*, June 1979, 107, 6, 36–47.

Haynes, S. N., Follingstad, D. R., & McGowan, W. T. Insomnia: Sleep patterns and anxiety level. *Journal of Psychosomatic Research*, 1974, *18*, 69–74.

Haynes, S., Woodward, S., Moran, R., & Alexander, D. Relaxation treatment of insomnia. *Behavior Therapy*, 1974, *5*, 555–558.

Henning, J. Drug interactions: Two are not always better than one. *Modern Health Care*, 1975, *4*(2), 38–42.

Hinkle, J. E., & Lutker, E. G. Insomnia: A new approach. *Psychotherapy: Theory, Research and Practice*, 1972, *9*, 236–237.

Institute of Medicine. *A report of a study: Sleeping pills, insomnia, and medical practice*. Washington: National Academy of Sciences, 1979.

Jacobson, E. *Progressive relaxation*. Chicago: University of Chicago Press, 1938.

Jason, L. Rapid improvement in insomnia following self-monitoring. *Journal of Behavior Therapy and Experimental Psychiatry*, 1975, *6*, 349–350.

Johnson, S. M., & White, G. Self-observation as an agent of behavioral change. *Behavior Therapy*, 1971, *2*, 488–497.

Jouvet, M. Biogenic amines and the states of sleep. *Science*, 1969, *163*, 32–41.

Kahn, M., Baker, B., & Weiss, J. Treatment of insomnia by relaxation training. *Journal of Abnormal Psychology*, 1968, *73*, 556–558.

Kales, A., & Kales, J. Recent advances in the diagnosis and treatment of sleep disorders. In G. Usdin (Ed.), *Sleep research and clinical practice.* New York: Brunner/Mazel, 1973.

Kales, J., Tan, T. L., Swearingen, C., & Kales, A. Are over-the-counter sleep medications effective? All night EEG studies. *Current Therapeutic Research, Clinical and Experimental,* 1971, *13,* 143–151.

Kales, A., Bixler, E. O., Tan, T. L., Scharf, M. B., & Kales, J. D. Chronic hypnotic drug use: Ineffectiveness, drug withdrawal insomnia, and dependence. *Journal of the American Medical Association,* 1974, *227,* 513–517.

Kales, A., Caldwell, A., Preston, T., Healey, J., & Kales, J. Personality patterns in insomnia. *Archives of General Psychiatry,* 1976, *33,* 1128–1134.

Kales, A., Caldwell, A., Bixler, E. O., Healey, S., Kales, J. D., & Preston, T. A. Further evaluation of MMPI findings in insomnia: Comparison of insomniac patients and normal controls. *Sleep Research,* 1978, *7,* 189.

Karacan, I., & Williams, R. L. Insomnia: Old wine in a new bottle. *Psychiatric Quarterly,* 1971, *45,* 274–288.

Karacan, I., Moore, C., & Williams, R. L. The narcoleptic syndrome. *Psychiatric Annals,* 1979, *9,* 69–76.

Kleitman, N. *Sleep and wakefulness.* Chicago: University of Chicago Press, 1963.

Knapp, T., Downs, D., & Alperson, J. Behavior therapy for insomnia: A review. *Behavior Therapy,* 1976, *7,* 614–625.

Loomis, A. L., Harvey, E. N., & Hobart, G. A. Cerebral states during sleep, as stated by human brain potentials. *Journal of Experimental Psychology,* 1937, *21,* 127–144.

Mendelson, W. B., Gillin, J. C., & Wyatt, R. J. *Human sleep and its disorders.* New York: Plenum, 1977.

Monroe, L. J. Psychological and physiological differences between good and poor sleepers. *Journal of Abnormal Psychology,* 1967, *72,* 255–264.

Montgomery, I., Perkin, G., & Wise, D. A review of behavioral treatments for insomnia. *Journal of Behavior Therapy and Experimental Psychiatry,* 1975, *6,* 93–100.

National Academy of Sciences, Institute of Medicine. Report of a study: sleeping pills, insomnia, and medical practice. National Academy of Sciences: Washington, 1979.

Nicassio, P. M., & Bootzin, R. R. A comparison of progressive relaxation and autogenic training as treatments for insomnia. *Journal of Abnormal Psychology,* 1974, *83,* 253–260.

Oswald, I., Berger, R., Jaramillo, R., Keddie, K., Alley, P., & Plunkett, G. Melancholia and barbiturates. A controlled EEG, body and eye movement study of sleep. *British Journal of Psychiatry,* 1963, *109,* 66–78.

Paul, G. L. Physiological effects of relaxation training and hypnotic suggestion. *Journal of Abnormal Psychology,* 1969, *74,* 425–537.

Peper, E. Frontiers of clinical biofeedback. In L. Birk (Ed.), *Seminars in psychiatry* (Vol. 5). New York: Grune & Stratton, 1973.

Raskin, M., Johnson, G., & Rondestvedt, J. W. Chronic anxiety treated by feedback-induced muscle relaxation: A pilot study. *Archives of General Psychiatry,* 1973, *28,* 263–266.

Regestein, Q. R. Practical ways to manage chronic insomnia. *Medical Times,* June 1979, *107, 6,* 19–23.

Ribordy, S. C., & Denney, D. R. The behavioral treatment of insomnia: An alternative to drug therapy. *Behaviour Research and Therapy,* 1977, *15,* 39–50.

Richardson, G. S., Carskadon, M. A., Flagg, W., Van Den Hoed, J., Dement, W. C., & Mitler, M. M. Excessive daytime sleepiness in man: Multiple sleep latency measurement in narcoleptic and control subjects. *Electroencephalography and Clinical Neurophysiology,* 1978, *45,* 621–627.

Roffwarg, H. P., Dement, W. C., & Fisher, C. Preliminary observation of the sleep-dream pattern in neonates, infants, children and adults. In E. Harms (Ed.), *Problems of sleep and dream in children.* New York: Pergamon, 1964.

Schultz, J. H., & Luthe, W. *Autogenic training.* New York: Grune & Stratton, 1959.

Schwartz, D., Wang, M., Leitz, L., & Goss, M. Medication errors made by elderly, chronically ill patients. *American Journal of Public Health*, 1962, *52*(12), 2018–2029.

Shealy, R. C. The effectiveness of various treatment techniques on different degrees and duration of sleep-onset insomnia. *Behaviour Research and Therapy*, 1979, *17*, 541–546.

Steinmark, S. W., & Borkovec, T. D. Active and placebo treatment effects on moderate insomnia under counterdemand and positive demand instructions. *Journal of Abnormal Psychology*, 1974, *82*, 157–165.

Sunshine, A., Zighelboim, & Laska, E. Hypnotic activity of diphenhydramine, methapyrilene, and placebo. *Journal of Clinical Pharmacology*, August–September 1978, *18*(8–9), 425–431.

Teutsch, G., Mahler, D. L., & Brown, C. R. Hypnotic efficacy of diphenhydramine, methapyrilene, and pentobarbital. *Clinical Pharmacology and Therapeutics*, 1975, *17*, 195–201.

Turner, R. M. *A statistical and methodological analysis of behavior therapy treatment for insomnia*. Unpublished doctoral dissertation, Temple University, 1977.

Williams, R. L., Karacan, I., & Hursch, C. *EEG of human sleep: Clinical applications*. New York: Wiley, 1974.

Wolpe, J. *The practice of behavior therapy*. New York: Pergamon, 1969.

PART III

THERAPEUTIC APPROACHES TO SPECIAL POPULATIONS

Psychological Sequelae to Rape

Assessment and Treatment Strategies

DEAN G. KILPATRICK, LOIS J. VERONEN, AND PATRICIA A. RESICK

INTRODUCTION

The scientific study of the effects of rape is in its infancy, as is the development and evaluation of intervention strategies for rape-related problems. This state of affairs poses certain problems for the writer charged with the task of reviewing virtually nonexistent treatment research and venturing evaluative judgments on the relative merits of behavioral versus more traditional approaches. Therefore, this chapter will of necessity be speculative in nature.

Although there are no well-controlled treatment outcome data to guide us, some information is beginning to emerge regarding the aftermath of a rape experience. These are informative as to the types of problems that develop and provide information about how rape-related problems change over time. Moreover, social behavioral learning theory formulations that attempt to predict and explain the development of rape-related problems have received empirical support from assessment research. Additionally, many rape-induced problems appear to be similar to problems that have

DEAN G. KILPATRICK and LOIS J. VERONEN • Department of Psychiatry and Behavioral Sciences, Medical University of South Carolina, and People Against Rape, Charleston, South Carolina 29425. PATRICIA A. RESICK • Department of Psychology, University of Missouri, St. Louis, Missouri 63121.

proven responsive to various behavioral treatment procedures. Therefore, this chapter will focus on the following areas. First, the scope of the sexual-assault problem and the results of existing research regarding the effects of rape on psychological functioning will be reviewed. Second, a social learning theory model that attempts to explain and predict the development of rape-induced problems will be presented. The advantages of this behavioral model over more traditional conceptualizations will also be discussed. The behavioral procedures that should prove effective in the treatment of rape-related problems will be described. Treatment recommendations will be offered for problems that occur immediately following the rape and for those that represent more long-term problems.

THE SCOPE OF SEXUAL ASSAULT

One of the most difficult problems in sexual assault research is to obtain an accurate estimate of the incidence of the problem. There is considerable support for the contention that the number of reported rapes has increased considerably over the past few years. Federal Bureau of Investigation Uniform Crime Reports state that the number of rape offenses reported to law enforcement officials rose from 37,900 in 1970 to 63,020 in 1977, an increase of 166%.

Many rape offenses are never reported. Therefore, a major problem is obtaining some estimate of the number of nonreported rapes. Chappell (1976) has employed a victimization study model to obtain estimates of underreporting. A randomly selected sample of the population of interest was interviewed regarding the frequency of offenses perpetrated on them that were not reported. Chappell (1976) reports that a national victimization study conducted in 1967 found that the ratio of unreported to reported rapes was 3.5 to 1, whereas a more recent pilot study in two cities discovered a 2 to 1 ratio.

The results of these victimization studies have two major implications. First, victims who report a rape experience represent somewhere between 22% and 33% of all victims who are raped. Thus, some victims who seek services might be known to the treatment provider as having been victimized, but the treatment professional will see many clients whose rape experiences are unknown to him or her. Second, it is, therefore, recommended that all female clients should be asked if they have ever been victims of sexual assault. Because of the social stigma perceived by many victims, they might not volunteer the information unless it is requested.

Generally, forcible rape is legally defined as some type of penile–vaginal contact and/or penetration that is effected by force, threat of force, threat of retaliation, intoxication, or fraud. Obviously other types of unwanted sexual contact are equally disturbing, and many states have adopted new legal definitions that reflect this reality. In South Carolina, a

new law was enacted in 1977 describing criminal sexual conduct rather than rape and defining as illegal any type of sexual activity obtained by force, threat of force, coercion, or fraud. Under this new law, males as well as females can be victims of criminal sexual conduct, and there are different degrees of offense, based primarily on the amount of force or threat of force used. These new legal definitions of rape, which focus on the amount of violence, threat of violence, and coercion rather than on penile/vaginal contact, come much closer to capturing the true essence of a rape experience.

A rape experience can differ along many dimensions, and it is important to understand this diversity. Kilpatrick (1981) suggests that different types of rape experiences might be associated with the development of different postrape problems.

To further comprehend the scope of rape, it is necessary to understand the diversity of rape victims. Saunders (1976) has provided information regarding the characteristics of 123 rape victims who sought counseling. Saunders reports that 12% of the victims were 10 years old or less, 46% were between the ages of 11 and 20, 21% were between 21 and 30, and 11% were over 30; the age of the victim was not recorded in the remaining 10% of the cases. Of the victims, 55% were black, 41% were Caucasian, and no information was recorded for the remaining 4%. Additional information regarding the demographic and biographic characteristics of rape victims has been reported by other investigators (e.g., Feldman-Summers, Gordon, & Meagher, 1979; Holmstrom & Burgess, 1978; Kilpatrick, Veronen, & Resick, 1979a; Peters, 1975). The findings from these studies can be summarized in the following manner: Rape victims come from a variety of ages, occupations, and social classes. Males as well as females can be raped, although there is virtually nothing known about the characteristics of male victims. Criminal sexual conduct consisting of other than vaginal intercourse involves coercive, unwanted sexual activity, and there is no valid conceptual reason to assume that victims of criminal sexual conduct differ significantly from victims of rape.

A rape experience can have an important impact on the family and friends of a rape victim as well as on the victim. Therefore, the treatment professional might need to address the needs of the victim's family and friends as well.

PSYCHOLOGICAL RESPONSES TO SEXUAL ASSAULT

Prior to development of intervention strategies, a careful assessment of the incidence and severity of relevant behaviors is conducted. Without information about the behaviors that are most problematic, it is difficult to formulate an effective intervention strategy. However, in a recent review of existing research on psychological responses to sexual assault,

Kilpatrick (1981) noted that with few exceptions (e.g., Feldman-Summers *et al.*, 1979; Kilpatrick *et al.*, 1979a,b; Veronen & Kilpatrick, 1980; Veronen, Kilpatrick, & Resick, 1979), the existing research tends to be unsystematic, anecdotal, and based on single or a few clinical cases (e.g., Burgess & Holmstrom, 1974a; Factor, 1954; McCombie, 1976; Peters, 1975; Queen's Bench Foundation, 1975; Sutherland & Scherl, 1970; Symonds, 1976; Werner, 1972).

It should be noted that Ann Burgess and Lynda Holmstrom, among the most influential writers in the field, have published numerous books and papers on the effects of rape (e.g., Burgess & Holmstrom, 1974a,b, 1975, 1976a,b; Burgess, Groth, Holmstrom, & Sgroi, 1978; Groth, Burgess, & Holmstrom, 1977; Holmstrom & Burgess, 1975, 1978), all of which are based largely on the results of a single study. The methodological problems with the Burgess and Holmstrom research have been reviewed elsewhere (Resick, Kilpatrick, & Veronen, 1979). In brief, the problems include (a) inadequate description of the sampling procedures by which victims were recruited into the study, (b) no attention to the issue of potential sample bias resulting from low participation rates, (c) absence of any type of comparison or control group of nonraped women, and (d) no use of any type of standardized measure of psychological response or provision of information on the reliability or validity of measures that were used. The findings of these studies appear to have been generalized far beyond the data to support them.

The establishment of the National Center for Prevention and Control of Rape in the National Institute of Mental Health in 1976 provided a great impetus for rape research. Several investigators are presently conducting research funded by the national center on various aspects of response to sexual assault and treatment of rape-induced problems.

Feldman-Summers *et al.* (1979) studied 50 rape victims who had reported their victimization to a rape counseling center and who volunteered to participate in the research. After questioning these women regarding whether they had (a) engaged in intercourse prior to the rape, (b) had a steady sexual partner prior to the rape, and (c) had maintained the same partner for at least 2 months after the rape, 15 Anglo women were identified who met the criteria for participation. These women had a mean age of 27.7 years, and the amount of time postrape ranged from 2 months to 7 years, with a median of 12 months.

All 15 women then rated retrospectively their satisfaction with 23 sex-related activities during three time periods: (a) 1 week before the rape; (b) 1 week after the rape; and (c) 2 months after the rape. A comparison group was selected that was similar to the victim group with respect to race, age, education, and religion. The exact procedure by which the comparison group was recruited was not described. Nonvictims were asked to respond to the sexual satisfaction items as they were descriptive of their current sexual functioning. Both victim and nonvictim groups were also asked to report the frequency of several sexual behaviors, including oral

sex, sexual intercourse, anal intercourse, masturbation, and orgasm. The major findings were that victims and nonvictims did not differ on the frequency of sexual-behavior measures, nor on the degree of satisfaction with sexual activities prior to the rape. However, on 16 of the 23 items, victims reported obtaining less satisfaction 1 week postrape than during the prerape period. Interestingly, the only activities that were not rated as less satisfying during the postrape period were those involving masturbation and primarily affectional behaviors such as holding hands, hugging, and talking with or being held by one's partner. Satisfaction tended to increase somewhat during the 2-month postrape period but did not approach the levels of satisfaction experienced prior to the rape.

Feldman-Summers *et al.* (1979) interpreted these findings as showing that a rape experience does not reduce the frequency of sexual behavior but does reduce the degree of satisfaction experienced during that behavior. Satisfaction is more specifically reduced for those sexual behaviors that are frequently involved in the rape itself, such as sexual intercourse, touching of genitals, and so forth. As will be discussed later, these findings dramatically support those hypothesized by a social learning theory model that attempts to explain the development of rape-induced problems (e.g., Kilpatrick, Veronen, & Resick, 1977; Kilpatrick, Best, & Veronen, 1978; Veronen & Kilpatrick, 1980).

Results of the Charleston Sexual Assault Research Project

In 1977, the National Center for Prevention and Control of Rape awarded a grant to the Sexual Assault Research Project, a joint venture of the Department of Psychiatry and Behavioral Sciences of the Medical University of South Carolina and People Against Rape. The major objectives of this research program were (1) to systematically assess the effects of a rape experience longitudinally and (2) to evaluate the efficacy of three procedures designed to treat rape-induced fear and anxiety problems. Two experiments were designed to accomplish these objectives. The first experiment sought to study postrape effects by assessing recent rape victims aged 16 or older at each of the following postrape periods: (1) 6–10 days, (2) 1 month, (3) 3 months, (4) 6 months, and (5) 1 year. A comparison group of nonraped women, selected from the same neighborhoods as the corresponding victims and matched for age and race, was to be assessed at comparable periods. A portion of the assessment battery consisted of a series of standardized, objective instruments that measured anxiety, fear, other mood states, and psychological distress. Other objective measures of self-concept and self-esteem were included in the assessment battery. A structured clinical interview, providing information about pertinent background variables and rape reactions, comprised the final portion of the assessment battery. As of November 30, 1978, a total of 46 victims and 35 nonvictims had participated in this assessment study.

Detailed findings of this assessment study have been presented in

several recent papers (Kilpatrick *et al.*, 1979a & b; Veronen *et al.*, 1979) and will only be summarized here. In one portion of the study, victims were requested to rate the extent to which they experienced a variety of physiological and cognitive symptoms during the rape itself and during the 2–3 hour postrape period (Veronen *et al.*, 1979). The results indicated that victims experienced profound cognitive and physiological symptoms of anxiety during the rape itself and for several hours thereafter. These findings strongly suggest that the current police practice of obtaining a complete statement from the victim during the immediate postrape period is ill-advised because high levels of anxiety interfere with cognitive functioning and memory. Victims can be expected to remember more details as their anxiety-induced cognitive disruption declines. Therefore, the typical defense attorney tactic of exploiting discrepancies between initial and subsequent statements is clearly inappropriate. Victims also reported being greatly distressed by the prospect of court appearances and contact with the police, suggesting the advisability of using anxiety management procedures (see Chapter 4) and/or behavioral rehearsal (see Chapter 6) to prepare the victim for court testimony.

Kilpatrick *et al.* (1979a) presented data on 46 recent rape victims and 35 nonvictims who were assessed at four time intervals from 6–10 days to 6 months postrape. At the 6–10 day postrape assessment, victims were in a state of acute psychological distress. Measures of fear, anxiety, and mood state were significantly higher for victims than for nonvictims. The measure of psychiatric disturbance also revealed this generalized distress reaction. Of 28 variables in the assessment battery, 25 were found to reflect significantly more distress in the victim group. This generalized state of distress persisted for at least 1 month postrape. At this assessment session, victims remained significantly more disturbed than nonvictims on the fear, anxiety, mood state, and psychiatric distress measures. However, there was a definite tendency for the victims' scores to decrease somewhat. By the 3-month assessment, there was a marked decrease in generalized distress in the victim group. Only 7 of the 28 variables yielded significant differences between groups. The variables that remained high were primarily indices of fear and anxiety. At the 6-month assessment, the results were quite similar to the 3-month assessment. Again, 7 of 28 variables were found to be significantly different between groups. The variables that were notably higher for the victim group confirm the hypothesis that fear and anxiety are persistent problems for victims of rape and suggest that such fear and anxiety can continue for months postrape in the absence of intervention.

Changes in specific fears of victims and nonvictims occurring over the 6-month postrape period have also been examined (Kilpatrick *et al.*, 1979b). The Modified Fear Survey (Veronen & Kilpatrick, 1980), was administered to 46 victims and 35 nonvictims at the aforementioned assessment intervals. Victims were significantly more fearful than nonvictims during all postrape periods. The magnitude of overall fearfulness of

victims diminished throughout the first 3 months of the postrape period but remained constant between 3 and 6 months postrape. The nature of victim fears were clearly rape related and centered around three areas: (1) stimuli or items that were directly associated with the attack itself, such as a man's penis, anal intercourse, and tough-looking people; (2) rape consequences or fears that were precipitated by the rape itself, such as testifying in court, venereal disease, and talking to police; and (3) vulnerability to future attack, such as being alone, having people behind them, and being in a strange place. The pattern of fear appeared to change over time, with items relating to the direct attack diminishing consistently. Items related to rape consequences were less stable in their pattern, and items related to vulnerability to future attack appeared to remain consistent in fear ratings across all assessment sessions. Furthermore, there was some suggestion that fears related to vulnerability to future attack might incubate or increase as time postrape increases.

THEORETICAL APPROACHES TO ASSESSMENT AND TREATMENT OF SEXUAL ASSAULT VICTIMS

Treatment procedures are an extension of conceptual frameworks and theories about human behavior. Behavior is always a complex, multidetermined phenomenon influenced by a variety of biological and psychosocial variables. Conceptual models and theories that attempt to explain and predict behavior serve several important functions, among the most important of which is guiding the observer in the selection of which variables are to be observed and/or manipulated. Without a theoretical framework, the researcher or clinician can become lost in a sea of data, speculation, and conjecture.

Nonbehavioral Theories

Feminists have provided important theoretical perspectives on the sociocultural variables that influence the occurrence of rape (e.g., Albin, 1977; Brownmiller, 1975), and sociologists have described factors that have contributed to an unfortunate lack of focus on the topic of rape by this and other societies (e.g., Schwartz, 1981). It is important to note that it was primarily feminists and grass-roots groups that placed rape on the nation's agenda, rather than professional groups (Largen, 1976; Resick & Jackson, 1976). However, if our major interest is not in the causes of rape but in the causes of rape-related problems, there has been a paucity of useful theoretical material to guide us, with the exception of recent behavioral formulations.

The rape crisis center movement (Largen, 1976) has provided valuable information about the problems and needs of victims and has con-

tributed the important theoretical notion that assisting the victim regain control of her life is the sine qua non of effective counseling. As usual, the contribution of psychoanalytic theory (e.g., Deutsch, 1945; Factor, 1954) has been less than impressive, often suggesting that women exhibit "unconscious complicity" in the rape. Other analytically oriented writers have taken a more descriptive, less theoretical posture (e.g., Notman & Nadelson, 1976; Werner, 1972). Psychoanalytic theory, with its emphasis on trait theory and the importance of early childhood experience, is not well-suited to deal with rape, an event that occurs unpredictably and suddenly, a point that has been made by Albin (1977) and Midlarsky (1981).

The only major competitor to the behavioral conceptualization is the crisis theory model proposed by Burgess and Holmstrom (1974a), based largely on the work of Caplan (1964). Caplan defines a crisis as a psychological disequilibrium in a person who is confronted with a problem that he or she can neither solve nor escape using customary problem-solving resources; during the crisis period, new ways of handling the problem are sought. By definition, a crisis is time limited and is terminated when a state of psychological equilibrium is regained. The postcrisis equilibrium can be at a higher level of functioning than existed prior to the crisis, and the goal of crisis intervention is to assist the client to identify problems and to develop more effective skills for coping with the crisis-provoking problem. Burgess and Holmstrom (1974a) apply this crisis model to rape victims, suggesting that "rape is a forced sexual aggression which results in a disruption of the individual's physical, emotional, social, and sexual equilibrium" (p. 109) and argue that rape seems to fit the definition of an externally imposed crisis.

The crisis model has been both appealing and influential, particularly for conceptualizing and dealing with the rape victim's behavior immediately after the rape. Certainly, the recent rape victim's behavior appears to be disorganized. Moreover, crisis theory does not dwell on hypothesized disturbances in the victim's psychosexual development and unconscious rape wishes as does psychoanalytic theory. Neither does it state that victims are "sick" and require long-term treatment. Rather, the therapeutic focus is on assisting the victim in the augmentation of coping skills in a time-limited context.

Despite these appealing aspects of crisis intervention theory and treatment and many glowing testimonials as to the efficacy of crisis intervention treatment (e.g., Burgess & Holmstrom, 1974a), crisis theory is not without major problems. Conceptually, it is characterized by considerable circularity and vagueness in definitions of key terms. For example, *disequilibrium* is inferred on the basis of an observed *crisis*. The presence of a crisis *a priori* means that *coping mechanisms* are not working sufficiently well. When the crisis goes away, we know (a) that the equilibrium has been regained and (b) that the coping mechanisms are now working. Thus, all important concepts in the theory are derived from an examina-

tion of the individual's behavior, from which *crisis, disequilibrium,* and *inadequate coping mechanisms* are inferred.

The second major problem with crisis theory is that it is of little value in predicting the precise problems most likely to develop following a sexual-assault experience. If rape is a crisis, then victims can be predicted to be in a *crisis state* for an undetermined length of time after the rape. However, this characterization of the victim's behavior is not particularly informative.

With respect to treatment approaches that have been generated by the feminist, sociological, psychoanalytic, and crisis theory models, there has not been a single published report in which a treatment technique has been systematically evaluated. There have been two case reports describing attempted treatment of rape victims by psychoanalytically oriented therapists (Factor, 1954; Werner, 1972), but both reports are impressionistic rather than data based. Similarly, Notman and Nadelson's (1976) paper gives several good treatment suggestions but provides no data regarding efficacy.

Burgess and Holmstrom's (1974a) book offers many practical suggestions regarding counseling and has been quite influential. However, there have been no systematic tests of the efficacy of any type of crisis counseling with rape victims. This is not to say that crisis counseling is not effective—only that it has not been evaluated.

Behavioral Theories

One of the great advantages of behavioral assessment and treatment approaches for rape-induced problems is that a clearly articulated conceptual and theoretical framework that explains and predicts the development of rape-related problems exists. Behavioral conceptualizations of rape-induced problems have not yet achieved the recognition and influence afforded to Burgess and Holmstrom's crisis theory formulations, but advances in the conceptualization, assessment, and treatment of rape-induced problems are being made. Because of the limited access to work by other behaviorists, this section will focus primarily on our own work.

The bulk of our research effort has focused on rape-induced fear and anxiety responses and the efficacy of several methods for treatment. This is not to say that other problems do not develop from a rape experience; in fact, there is considerable reason to believe that they do. However, our previously discussed research produced clear evidence that fear and anxiety are paramount problems for rape victims, particularly during the immediate postrape period. Behavioral conceptualizations of the etiology of rape-induced fear, anxiety, depression, and sexual dysfunction have been detailed elsewhere (e.g., Kilpatrick *et al.*, 1977, 1978, 1979b; Resick & Jackson, 1976; Veronen & Kilpatrick, 1980; Veronen *et al.*, 1979). Therefore, rather than recapitulating this material in depth, relevant aspects of the theory will be summarized.

Classical Conditioning of Fear and Anxiety

The key factor in understanding the etiology of rape-induced problems is to grasp the essence of the rape experience for the victim. It is abundantly clear that, for the victim, a rape experience means being powerless, helpless, vulnerable, and in danger of serious physical harm or even death. This is true whether the rapist is a total stranger who attacks her using a weapon while she is sleeping or whether he is an acquaintance who forces himself on her in a dating situation. In any case, rape represents a situation that is out of control, is perceived as a threat to physical and psychological safety, and is terrifying. Obviously, sexual intercourse under such conditions is painful. Pain also results from the physical violence perpetrated by many rapists. When subjected to such a dangerous and painful situation, it is reasonable to assume that the rape victim would respond by experiencing high levels of fear and anxiety. Empirical support for this contention has been found (Veronen et al., 1979) in that 96% of victims reported feeling scared, 92% felt terrified, 96% felt worried, and 88% felt helpless during the rape. Moreover, a high percentage of victims reported experiencing such physiological symptoms of anxiety as shaking or trembling (96%), heart racing (84%), pain (72%), tight muscles (68%), and rapid breathing (64%). Thus, a rape experience can be conceptualized as a classical conditioning situation (see Chapter 2) in which the confinement, helplessness, pain, and/or threat of physical harm or death are unconditioned stimuli (UCSs) that evoke unconditioned responses (UCRs) of terror and extreme anxiety. Stimuli associated with these rape-induced UCSs acquire the capacity to evoke fear and anxiety as well. Thus, conditioned stimuli (CSs) such as persons, situations, or events present at the time of the rape acquire the capacity to produce conditioned responses (CRs) of fear and anxiety through their association with rape-induced terror. Some stimuli that are present in all rape situations, such as a man and cues associated with sexual intercourse, should be CSs for fear and anxiety for practically all rape victims. Other stimuli are more idiosyncratic to each specific rape case, and these stimuli should be CSs only in those cases in which they are involved. Thus, if one wished to predict the types of situations most likely to produce fear and anxiety for a particular rape victim, it would be necessary to obtain a detailed description of the stimuli present in her rape situation. For example, a woman awakened from sleep at night and raped by a white man with a gun might develop conditioned anxiety responses to sleeping, being alone at night, white men, and/or guns. The proposed classical conditioning model predicts that a victim's observed fears are related to the particular circumstances of her rape situation. Classical conditioning literature also suggests that fear and anxiety responses can generalize to other stimuli similar to CSs present during the rape. Thus, the anxiety response elicited by the stimulus of the rapist might generalize to other men with similar physical characteristics.

Having described the development of rape-related conditioned stimuli or cues that elicit fear and anxiety, it is important to consider the effects of encountering these cues. Anxiety can be experienced in the cognitive "channel," the autonomic channel, or the overt behavioral channel (Lang, 1969). However, perhaps the most common response to rape-related conditioned stimuli is the development of avoidance behavior. Generally, rape victims tend to avoid all stimuli or situations that remind them of the rape. Because making an avoidance response is negatively reinforced by the anxiety reduction following the avoidance behavior, avoidance behavior frequently becomes quite resistant to extinction. Moreover, the number of cues precipitating avoidance behavior can be so numerous that the victim's behavior becomes quite restricted. Given that it is generally agreed that nonreinforced exposure to the feared object, or extinction, is the key element in resolution of a phobia (e.g., Bandura, 1969; O'Leary & Wilson, 1975), avoidance behavior must be changed if fear responses are to be reduced. In addition, reduced levels of activity produced by avoidance behavior can contribute to the development of depression as well.

Second-Order Conditioning and Conflict

As described in the previous section, cues or stimuli associated with the rape experience become rape cues or conditioned stimuli that can evoke fear and anxiety. Recently, it has been suggested (Kilpatrick, 1978) that cognitive events such as thoughts can become conditioned stimuli and, as such, are capable of evoking anxiety. Thus, thoughts (cognitions) that are associated with the rape experience become conditioned stimuli (cues) for fear and anxiety. An excellent example of this phenomenon is the rape victim who becomes anxious when asked to describe her rape experience to a friend, law enforcement officials, a crisis counselor, a therapist, or a researcher. In such a case, there are few, if any, physical stimuli to remind the victim of the rape. Rather, it is the cognitive stimuli (cues) that evoke anxiety through their association with the rape experience.

Regardless of whether rape cues are physical or cognitive, their presence will provoke anxiety in the victim. When such a cue produces a conditioned anxiety response, the victim is once more in a state of high arousal and subjective distress. According to the principles of classical conditioning, any stimuli or cues present during this state can become conditioned stimuli for conditioned emotional responses via their association with the original rape cues or conditioned stimuli.

According to the concept of second-order conditioning, a previously neutral stimulus, if associated with a conditioned stimulus capable of eliciting a particular response, acquires the capacity to elicit that response through the process of second-order conditioning. Thus, any stimulus present at the same time as rape-related conditioned stimuli or

cues can become a second-order conditioned stimulus that also evokes the conditioned response of anxiety and fear. Therefore, there is some theoretical reason to believe that rape victims can experience anxiety in the presence of those with whom victims discuss and/or think about the rape, no matter how sympathetic or supportive those people might be.

Another theoretical concept of considerable importance in understanding the rape victim's behavior is conflict. The key feature of a conflict situation is that one stimulus has the capacity to elicit two incompatible responses simultaneously. In an approach–avoidance conflict situation, the organism's behavior depends on the strength of approach tendencies, the strength of avoidance tendencies, and the steepness of the approach and avoidance gradients. Avoidance gradients are generally steeper than approach gradients, so approach behavior continues until approach and avoidance tendencies are approximately equal, at which point approach behavior ceases. The organism then retreats from the goal until a point is reached where avoidance tendencies are reduced. The behavior can be described as oscillatory, characterized by approach, then avoidance, then approach, then avoidance.

These phenomena have direct relevance to intervention with rape victims. It seems clear that a therapist can become a second-order conditioned stimulus for rape-induced conditioned fear and anxiety. All therapy involves at least some discussion of problems, and the majority of victims' problems involve the rape. Discussion of these rape-related problems inevitably requires the victim to experience many cognitive rape cues or conditioned stimuli. These cues evoke anxiety, and both the therapist and the therapy situation become associated with this rape-related anxiety. Since there is a strong tendency to escape or avoid such conditioned stimuli, there will be some tendency for the victim to avoid both the therapy and the therapist.

Obviously, the therapist and therapy situation also involve many potential positive aspects. A sympathetic, encouraging therapist offers considerable attention and support for the victim. Additionally, the victim can view therapy as an opportunity to make desired changes in her life. Thus, there is considerable potential support for therapy participation.

This analysis suggests that participation in therapy can represent a classic approach–avoidance conflict for rape victims. Rape victims might respond to this conflictual situation with ambivalence; that is they might first approach therapeutic participation and then retreat from it. Because of the inherently aversive nature of conflict situations, there can be a strong tendency to avoid therapy altogether. Shifts in the relative strengths of approach and avoidance tendencies will change the point at which approach behavior toward the goal will stop.

Two factors that might increase approach behavior toward therapy are social pressure from the victim's significant others to effect be-

havioral change and the occurrence of rape-related fears *outside* of the therapeutic situation that are greater than anxiety precipitated by the therapy.

Development of Depression

There is reason to hypothesize that depression might develop following a rape experience. The previously discussed reduction in the rate of behavior prompted by fear-induced avoidance behavior could result in a lowered rate of response-contingent positive reinforcement, thought to be a chief cause of depression (Lewinsohn, 1974). Moreover, withdrawal of support from significant others in the victim's life would also reduce the amount of reinforcement received by the victim. Seligman (1971) suggests that depression occurs as a function of learned helplessness, resulting from exposure to unpredictable, unavoidable aversive stimulation from which there is no possibility of escape. The depressed person believes that he or she has no control over subsequent events. The fact that 88% of the victims in our study described themselves as feeling helpless during the rape lends support to the supposition that rape victims might be expected to develop learned helplessness (i.e., depression). Additionally, the learned helplessness concept provides a strong theoretical underpinning for the frequently stated therapeutic goal of returning control and decision-making to the victim. Paykel (1974) states that depression usually occurs following one of three environmental events: (1) interpersonal losses, (2) threatening events, and (3) blows to self-esteem. Few would deny that rape can include any or all of these events.

The cognitive theory of depression proposed by Beck (1976) is also applicable to the rape situation. Vicitms are not immune to all of the myths concerning sexual assault that permeate our society. They very often feel they must have done something to bring on the assault or are being punished for something they did in the past. These beliefs are expressed even by victims who were asleep in locked homes at the time of the assault. In addition, because rape is a degrading, humiliating experience often followed by indifferent or disbelieving professionals, victims often feel worthless and ashamed. If societal and family reactions are rejecting or punitive, the victim might adopt many negative self-statements that can facilitate depression (see Chapter 8).

In summary, there is ample theoretical justification for assuming that at least some victims might experience depression following a rape experience. Moreover, it is reasonable to predict that those women who become the most depressed will be those who (1) exhibit reduced rates of behavior because they are avoiding feared situations and (2) perceive the least amount of control during and following the rape.

Development of Sexual Dysfunction

Sexual dysfunctions can evolve in a fashion similar to anxiety and depression. Sexual activity is an important part of a rape experience. The cues associated with sexual behavior elicit anxiety. Since high levels of anxiety are not conducive to enjoyment of sexual activity, it is understandable that victims might not find sexual activity enjoyable or satisfying (Feldman-Summers et al., 1979). Sexual dysfunction and loss of libido are also described as resulting from depression. Determining whether anxiety or depression is the primary etiological factor is difficult. The Feldman-Summers study showed that it was satisfaction with sexual activities similar to those performed in rape that was reduced, not the frequency of sexual behavior per se. Basically affectionate behaviors were rated as satisfying, as was masturbation, which suggests that the victims were not experiencing reduced libido. All of the women in that study had sexual partners. The woman who does not have a sexual partner might avoid social situations that involve the possibility of sexual activity or might experience considerably reduced interest in sexual intercourse. A more comprehensive discussion of issues involved in recognition and management of sexual dysfunction occurring after rape is presented elsewhere (Kilpatrick et al., 1978).

TREATMENT OF RAPE-RELATED PROBLEMS

This section will present suggestions regarding the behavioral treatment of rape-induced problems. There is emerging evidence that the profound distress experienced in the first month or two after sexual assault makes it difficult to attempt any type of therapeutic intervention requiring repeated, sustained therapeutic contact. Therefore, new intervention procedures for dealing with relatively short-term rape-related problems will be discussed as well. Prior to presentation of these behavioral treatment suggestions, the treatment study of the Sexual Assault Research Project will be briefly described.

The Sexual Assault Research Project Treatment Study

This ongoing effort was designed as an investigation of the efficacy of three procedures for treatment of rape-induced fear and anxiety responses. Victims of rape experiencing significant fear and anxiety at 3 months postrape or greater must select one of three treatment options: (1) stress inoculation (see Chapter 3); (2) systematic desensitization (see Chapter 4); or (3) peer counseling. Victims are not randomly assigned to treatment conditions for two major reasons. First, it is considered more ethical, in light of the need to allow victims to exercise options to combat feelings of helplessness, to allow victims to select a treatment after re-

ceiving a thorough description of the three treatments than to randomly assign them. Second, a major objective of the study was to gather information about the type of treatment most palatable to victims. This study is still in its preliminary stages, but it is interesting to note that, to date, 70% of the victims have selected the stress inoculation treatment and the remaining 30% selected peer counseling. No victim has selected systematic desensitization.

The assessment procedures of the study are a combination of single-case, multiple-baseline methodology and group outcome comparisons. Each victim identifies three target behaviors or situations in which they experience rape-related fear. Psychophysiological responses of electrodermal activity and heart rate, as well as self-report fear thermometer ratings, are obtained for each target behavior at the following intervals: (1) pretreatment; (2) after treatment of the first target behavior; (3) after treatment of second target behavior; and (4) 3 months after completion of treatment. Group outcome measures, consisting of a battery of standardized tests, are administered pre- and posttreatment and at the 3-month follow-up. Each victim receives 20 hours of treatment, which does not include assessment time, and all treatment procedures are conducted by one of three female peer counselors. These peer counselors had considerable prior experience working with rape victims and received training and supervision with respect to each of the three treatment procedures.

Treatment of Short-Term Rape-Related Problems

There is reason to believe that any intervention with recent rape victims must be relatively brief. Our clinical and research experience, theoretical analysis of therapy as an approach–avoidance conflict, and failure to find any evidence to the contrary in the clinical or scientific literature suggest that it is difficult, if not impossible, to engage recent rape victims in intervention procedures that involve systematic, relatively frequent, and sustained contact with a therapist. There are a variety of possible explanations for this. First, the victim's generalized distress makes it difficult for her to focus on a sustained treatment program. Second, sustained therapeutic contact might be expected to generate anxiety through the previously discussed mechanism of second-order conditioning. Thus, an intervention involving relatively brief contact might prove more palatable to victims. Our experience suggests that the amount of contact in our assessment study was acceptable and well-tolerated by victims. In fact, there was some evidence that participation in the assessment study might have been therapeutic for the victims. We have reason to believe that this is the case because of a low dropout rate in the ongoing assessment study and because of participants' verbal reports that they found project participation beneficial. In addition, scores on the State-Trait Anxiety Inventory indicated that participants rated

themselves as less anxious during the assessment sessions than they usually are in the "real world."

We presented previously a theoretical analysis suggesting that participation in therapy can be conceptualized as an approach–avoidance conflict. Two variables that might be expected to increase approach behavior toward therapy are (1) social pressure from the victim's significant others and/or (2) occurrence of anxiety in the real world that is greater than anxiety precipitated by therapy. Thus, the victim's subjective distress in the real world must be sufficiently great to override the anxiety-induced avoidance tendencies associated with participation in therapy if she is to seek therapy.

If this analysis is correct and all other variables are held constant, it follows that a major factor influencing a victim's participation in therapy is the magnitude of the rape-induced anxiety. If rape-induced anxiety remains high after the rape, the victim will be more likely to seek treatment than if her anxiety diminishes significantly. An important point is that a victim could have levels of anxiety high enough to be considerably disturbing and yet still avoid therapy, believing that it would produce even greater anxiety. Thus, if our assessment procedures reduce anxiety to a moderate but still disturbing level, this could have the effect of reducing one powerful variable that had produced approach behavior toward treatment.

Given this outcome, there remain two important questions. First, if subjective distress and anxiety have been reduced such that long-term treatment is not desired by victims, is there a need to develop other early intervention strategies? Second, if early intervention is warranted, what type of intervention seems most appropriate and feasible?

The first question must be answered affirmatively. At the 3- and 6-month postrape follow-ups, victims encounter many fear-eliciting cues that are not intrinsically dangerous but that might have long-term effects. These cues precipitate avoidance behavior, and if the victim continues to avoid dating, being alone, social situations, and so forth, her fear can incubate over time and she can lose many sources of pleasure and satisfaction. Therefore, the existence of fear and anxiety at the 3- and 6-month postrape periods, though not always sufficiently great to motivate participation in long-term treatment, still represents a significant problem for victims and requires the development of appropriate intervention strategies that might have a prophylactic effect.

We propose that an abbreviated and modified version of stress inoculation training can be adapted for use as a brief intervention procedure with recent rape victims. This two-session, 4-hour cognitive-behavioral treatment package combines elements of rape crisis counseling and stress inoculation and is called Brief Behavioral Intervention Procedure (BBIP). The development of BBIP was based on the following assumptions: (1) that victims share many cultural "myths" about rape; (2) that they have

difficulty in conceptualizing their rape experiences; (3) that they lack information about the kinds of rape-related problems they are likely to experience; and (4) that they lack skills for coping with rape-related problems. Thus, the BBIP was designed to provide specific information about rape myths, what a rape experience is like for most women, how we conceptualize the development of common rape-related problems and what the most common problems are and a description of strategies for coping with fear and anxiety responses. The BBIP provides a "cram course" about rape and how to cope with it. Additionally, victims are given the opportunity to relate their rape experience to a sympathetic nonjudgmental peer counselor.

The following components are included in BBIP. First, the victim is requested to describe her rape experience to the peer counselor. Prior to recounting her story, each victim is instructed in a brief relaxation procedure so she will be as relaxed as possible while she relates her experience. The peer counselor (a) acknowledges and facilitates the victim's discussion of her feelings about the assault, (b) stresses the fact that the victim's feelings about the rape are important and does not question or challenge the victim's experience, and (c) encourages the victim to believe that what she did and felt was both understandable and reasonable given the fact that she was in a life-threatening situation.

The second component of the BBIP involves the presentation of material about rape, with emphasis on the notion that rape is primarily an act of violence rather than a sexual act. Some of the more common cultural myths about rape are also addressed. All victims have grown up in a culture that holds certain attitudes about rape and stereotypes about rape victims (Kilpatrick, 1978). When a person is raped, these attitudes and expectancies can greatly influence how she or he behaves, thinks, and feels. Our culture generally believes that most women who are raped are in some way culpable. Illustrative of this point are recent data collected by Burt (1980), who measured rape attitudes of a random sample of the general population of the state of Minnesota ($n = 599$) and of a sample of convicted rapists ($n = 36$). Of the general population sample, 69% believed that in the majority of rape cases the victim was promiscuous or had a bad reputation; interestingly, only 14% of the rapist sample endorsed this belief. Of the general population sample, 71% believed that women with an unconscious wish to be raped can unconsciously do something to bring it on, but only 6% of the rapists so believed. The general population sample believed that 56% of reported rapes derive from women who were lying because they were angry with a man and were trying to get back at him. This same sample estimated that 53% of reported rapes were merely invented by women who discovered they were pregnant and wanted to protect their own reputation. Given these widely held negative attitudes about rape victims, which a woman has likely been frequently exposed to, the victim is apt to feel culpable. The

objective of this portion of treatment is to attempt to counteract some of these myths and counterproductive attitudes.

The third component of treatment consists of the presentation of a learning theory conceptualization of rape-induced fear and anxiety. This conceptualization includes (1) identification of rape as a life-threatening, dangerous event that induces terror, (2) explanation of classical conditioning and avoidance behavior precipitated by rape-related cues, and (3) description of fear as a three-channeled response.

The final component of treatment is the introduction of brief coping-skills training. The victim is offered a description of and a rationale for coping skills and is taught three: (1) deep breathing and minirelaxation; (2) guided self-dialogue; and (3) strategies for diminishing avoidance behavior. Because of time limitations, the BBIP is primarily educational in nature. Although coping skills are presented, there is no way to insure that these skills are appropriately practiced or utilized. However, a recent study (Jaremko, Hadfield, & Walker, 1979) that conducted a component analysis of stress inoculation training found that the educational component made the largest contribution to therapeutic efficacy.

The BBIP is feasible for use with recent rape victims and has several elements suggesting that it might serve a prophylactic function, particularly with respect to the development of rape-related fear and anxiety. However, both its feasibility and efficacy must be empirically evaluated by comparing the postrape status of victims with and without BBIP.

Treatment of Long-Term Fear and Anxiety

Presented in Table I are the rape-related target behaviors selected by victims in our long-term treatment study. Analysis of the percentage of victims endorsing various feared situations revealed that being alone (which included walking alone, being alone, going out alone, or sleeping alone) was feared by 90%. Night and/or darkness was another target behavior selected by 90% of the victims in treatment. The third most common target phobia was being approached by men, which was endorsed by 33% of the victims. In summary, there appears to be an underlying fear of recurrent attack.

Other behavioral anxiety management techniques (Chapters 3, 4, 24) could be expected to work effectively with rape-induced fear and anxiety, with one exception. The use of flooding or implosive procedures is ethically unjustified and is contraindicated. Two case histories in which stress inoculation training was used will be presented. A more comprehensive report of these case studies, including the results of psychometric evaluations, is found elsewhere (Veronen & Kilpatrick, in press). Blanchard and Abel (1976) reported the successful use of biofeedback to treat rape-induced tachycardia, as well.

TABLE I. TARGET PHOBIAS

Treatment candidate	Treatment targets	Treatment candidate	Treatment targets
A	1. Walking alone 2. Being talked about 3. Being dominated and/or protected by men	F	1. Going out alone at night 2. Observing or reading about violence 3. Sleeping alone at home at night
B	1. Being alone at night 2. Being approached by black men 3. Observing someone being confined, restricted or made helpless	G	1. Walking from car to apartment or apartment to car alone at night 2. Being alone in the car after dark 3. Being approached by a man or men
C	1. Being alone at home at night 2. People behind me 3. People in authority	H	1. Teenage boys 2. Going out alone at night 3. Being alone at home
D	1. Walking up and being harmed or child being harmed 2. Night and/or darkness 3. Sleeping in the bedroom	I	1. Not being able to get help 2. Being alone at night 3. Darkness
E	1. Being alone at home at night 2. Being approached by men 3. Being observed and criticized	J	1. Being alone at night 2. Unexpected movements of people 3. Watching violence on television or at the movies

Stress Inoculation Training for Rape Victims

Veronen, Kilpatrick, and Resick (1978) have made some alterations to adapt standard stress inoculation training (SIT) for use with rape victims: (1) a classical conditioning explanation of fear is substituted for the Schacterian explanation of fear; (2) the number and type of coping skills that are taught are clearly specified; and (3) the rehearsal and application phases are combined into a single phase.

Stress inoculation training for rape victims begins with a two-session educational phase during which an explanation of the victim's fear reaction is offered. The origin of the fear is traced to the traumatic event of the rape. Situations and stimuli reminiscent of fear have the capacity to evoke fear responses whether or not the victim is aware of it. Thus, the phenomena of classical conditioning, stimulus generalization, and avoidance behavior are utilized to explain to the victim the origins of her fears, her past and present reactions, and her subsequent reactions. Additionally, the manifestation of fear via three modalities (autonomic,

behavioral, and cognitive) is discussed. A tripartite model of fear (Lang, 1968) is also utilized to explain the various ways fear can be expressed.

A second phase involves teaching the victim skills to counter the expression of fear in each modality. Deep breathing and muscle relaxation are taught to combat the autonomic manifestations of fear. The fear responses of the behavioral modality are managed by role-playing and covert modeling. The cognitive expression of fear is treated through the acquisition of thought stopping and guided self-dialogue. Guided self-dialogue is a variant of self-instructional speech or cognitive coping (Meichenbaum & Cameron, 1972).

As soon as a skill is taught, it is immediately applied to the first target phobia. For example, if the target phobia is staying alone and the skill to be acquired is muscle relaxation, the victim is instructed to use the muscle relaxation skill at the first cue of muscle tension occurring when she is alone. Additionally, the victim is instructed also to practice the skill on a nontarget fear.

During sessions 3–14, the six coping skills are taught and immediately applied. During sessions 15–20, the second target phobia is treated. At this point in treatment, the victim has acquired the entire arsenal of coping skills; therefore, the phobia is treated utilizing any or all of the skills. The victim is instructed to select and utilize those skills that she feels are most beneficial for her.

Case Histories of Stress Inoculation Treatment for Rape Victims

A. D. was a white, 22-year-old rape victim who entered treatment 1 year postrape. Her presenting target phobias were (1) being alone at night, (2) being approached by black men, and (3) observing someone being confined, restricted, or made helpless. She had been raped in her own apartment by a young black man who broke in and who was never apprehended. Her fear was so intense that her husband was forced to quit his night job to be at home with her during the evening hours. She felt uncomfortable coming and going from her house. She reported walking well out of her way to avoid meeting a black man on the street. Violent acts in which she either imagined or viewed the victim being restrained, confined, or made helpless by force were particularly distressing. Less distressing were actions of violence that involved the use of a weapon.

Stress inoculation training was conducted. Following the 10th session, A. D. began staying alone, and, although she initially reported being highly anxious, she became increasingly comfortable through utilization of coping skills. Approach by black men was also markedly less anxiety provoking. She related situations in which she had greeted older black men as she quickly passed by them. The skill that she reported as most beneficial was the guided self-dialogue.

During the final week of SIT, A. D. was hospitalized and found to

have a rare lung disease. During this hospitalization and shortly after her release, she was exposed to several marriage and financial problems brought on by her husband. Despite these stressors, she continued to function. She relates her current capacity to manage the anxiety and stress in her life to SIT.

In summary, SIT was effective in reducing fear and anxiety surrounding being alone and being approached by black men. A. D. also reported significantly less anxiety when viewing violence, although this target phobia had not been treated. Additionally, she later encountered several life crises that she felt she was confidently and efficiently managing. Psychometric data showed reductions in fear and anxiety scores but not on other variables, supporting the specificity of stress inoculation for the reduction of fear and anxiety responses.

SIT was also used in the treatment of an extremely petite 32-year-old woman of average intelligence from a low socioeconomic class. L. L. was struck across her jaw, knocked unconscious, and dragged into a bedroom in her home after falling asleep watching television. She regained consciousness in her bedroom with her black assailant raping her. A short time later, she heard her 6-year-old son outside the bedroom, and the assailant threatened to kill the child if L. L. did not send him back to bed. L. L. sustained a broken jaw during the rape.

The phobias for which she was treated included sleeping in the bedroom, fear of her child being harmed, and nightfall. She was unable to enter the bedroom to sleep and spent her nights in a rocking chair in the middle of the living room, with her child on the couch near her. She walked to school to take and pick up her child and continually checked and rechecked her windows and doors.

Stress inoculation training was begun, but following the third session the assailant returned. Although this time he did not rape her, her fears of break-ins and her concern for safety intensified. The break-in precipitated a second crisis state of equal magnitude to the first. Her ability to concentrate became so impaired that she was unable to continue in SIT. It was temporarily terminated, and she was referred for crisis counseling. Three months after the break-in, SIT was reinitiated. She had moved, and her fears had altered somewhat. She identified being alone, inability to get help, and darkness as her greatest fears.

Significant improvement was noted after several sessions. She was able to remain by herself at home. Initially, she remained on the phone while alone; later, she was able to use her time constructively for reading and housework. She discontinued her compulsive checking and reported that the coping skills approach had been very effective in altering her fear of being unable to get help in the event of a crisis. It appeared that the systematic relaxation exercise might have been the most beneficial in altering her behavior because her overall level of anxiety was diminished, enabling her to employ the cognitive strategies for coping.

Nontarget stressors identified and used to teach the coping skills included seeing and walking near black men and asking men for directions or instructions.

Her assailant was reportedly apprehended after her 12th session. Despite considerable fear, she called the police department and requested a lineup. She utilized her coping skills in dealing with this nontarget fear by role-playing a telephone call to the police with one of her girlfriends and utilizing covert modeling to imagine herself dealing with the anxiety of seeing her assailant. Overall, the coping strategies became a conscious part of her life, and she sought situations in which they could be employed.

Treatment of Depression

Victims of sexual assault frequently experience episodes of depression. The intensity of these episodes can range from mild dysphoria to suicidal ideation. Whether the incidence and extent of depression is greater in the rape victim population than in the nonvictim population is yet to be determined. Katz and Mazur (1979) found that $\frac{1}{4}$ of female suicide attempters reported a past rape.

Our data indicate that depression appears to be present throughout the postrape year. The only time, however, in which victims' depression scores are significantly different from nonvictims' scores is during the 6- to 10-day and 1-month postrape assessments. But, this must be interpreted cautiously because the victim is experiencing a generalized distress state and nearly all measures of distress and pathology are significantly different from the nonvictim group.

Depression in the rape victim has been treated utilizing strategies adopted from Whaley and Malott (1971), Libet and Lewinsohn (1973), and Lewinsohn (1974). Rape-precipitated concerns for safety and preoccupation with future attack have the effect of reducing the victim's oppportunity of reinforcing experiences; thus, a low rate of response-contingent reinforcement ensues. This formulation of depression is particularly applicable for the victim who has quit work, changed jobs, moved, or radically restricted social interactions subsequent to an assault.

Cognitive features of rape victims that can make them likely candidates for cognitive behavior management approaches (see Chapter 3, see also Beck, 1976) include strong feelings of self-blame regarding the rape and a view of the rape as self-devaluation (i.e., "I am bad since bad things happen to me").

Treatment of Sexual Dysfunction

Rape is an act of power, and victims do not perceive it as an act of sex. Victims' subsequent fears and those that they select as target phobias are vulnerability to attack, violence, and staying alone. That sexual phobias

are not more prevalent might be due to priority of needs. Consistent with Maslow's hierarchy of needs, the need for safety appears to supersede all other needs. It could be that the report of sexual dysfunction in victims of rape will not appear until the fear of vulnerability to future attack has abated.

Of the victims who have been treated for sexual dysfunction, a variety of problems have presented: lack of satisfaction, confusion regarding appropriate sexual conduct in dating situations, avoidance and general discomfort with men, lack of assertiveness in managing sexual advances of men, and a penetration phobia.

The straightforward and clearly defined behavioral approaches of Masters and Johnson (1970), Annon (1974), and Kaplan (1974) are helpful in treatment of the more clearly defined sexual problems. For other problems that might be less clearly sexual, such as confusion regarding appropriate sexual conduct on dates, the treatment procedure might require an educational phase and a self-instructional phase in which the client is required to ask several of her girlfriends about their conduct for sexual behavior in dating situations. The problem regarding appropriate sexual and affectional conduct tends to be a greater concern for the adolescent victim who has had little dating experience prior to the time she was assaulted. Assertiveness training might be indicated for the victim who feels passive and powerless when she is in dating situations in which sexual behavior might occur.

REFERENCES

Albin, R. S. Review essay: Psychological studies of rape. *SIGNS: Journal of Women in Culture and Society,* 1977, *3,* 423–435.

Annon, J. S. *The behavioral treatment of sexual problems. Vol. 1: Brief therapy.* Honolulu: Enabling Systems, 1974.

Bandura, A. *Principles of behavior modification.* New York: Holt, Rinehart & Winston, 1969.

Beck, A. T. *Cognitive therapy and the emotional disorders.* New York: International Universities Press, 1976.

Blanchard, E. B., & Abel, G. An experimental case study of the biofeedback treatment of a rape-induced psychophysiological cardiovascular disorder. *Behavior Therapy,* 1976, *7,* 113–110.

Brownmiller, S. *Against our will.* New York: Simon & Schuster, 1975.

Burgess, A. W., & Holmstrom, L. L. *Rape: Victims of crisis.* Bowie, Md.: Robert J. Bradly, 1974. (a)

Burgess, A. W., & Holmstrom, L. L. Rape trauma syndrome. *American Journal of Psychiatry,* 1974, *131*(9), 981–986. (b)

Burgess, A. W., & Holmstrom, L. L. Sexual assaults: Signs and symptoms. *Journal of Emergency Nursing,* 1975, *1*(2), 11–15.

Burgess, A. W., & Holmstrom, L. L. Rape: Its effect on task performance at varying stages in the life cycle. In M. J. Walker & S. L. Brodsky (Eds.), *Sexual assault: The victim and the rapist.* Lexington, Mass.: D. C. Heath, 1976. (a)

Burgess, A. W., & Holmstrom, L. L. Coping behavior of the rape victim. *American Journal of Psychiatry,* 1976, *133*(4), 413–414. (b)

Burgess, A. W., Groth, A. W., Holmstrom, L. L., & Sgroi, S. *Sexual assault of children and adolescents*. Lexington, Mass.: D. C. Heath, 1978.

Burt, M. R. Cultural myths and supports for rape. *Journal of Personality and Social Psychology*, 1980, *37*, 217–230.

Caplan, G. *Principles of preventive psychiatry*. New York: Basic Books, 1964.

Chappell, D. Forcible rape and the criminal justice system: Surveying present practices and projecting future trends. In M. J. Walker & S. L. Brodsky (Eds.), *Sexual assault: The victim and the rapist*. Lexington, Mass.: D. C. Heath, 1976.

Deutsch, H. *The psychology of women: A psychoanalytic interpretation by Helene Deutsch* (Vol. 2). New York: Grune & Stratton, 1945.

Factor, M. A woman's psychological reaction to attempted rape. *Psychoanalytic Quarterly*, 1954, *23*, 243–244.

Feldman-Summers, S., Gordon, P. E., & Meagher, J. R. The impact of rape on sexual satisfaction. *Journal of Abnormal Psychology*, 1979, *88*(1), 101–105.

Groth, A. N., Burgess, A. W., & Holmstrom, L. L. Rape: Power, anger, and sexuality. *American Journal of Psychiatry*, 1977, *134*(11), 1239–1243.

Holmstrom, L. L., & Burgess, A. W. Assessing trauma in the rape victim. *American Journal of Nursing*, August 1975, *75*(8), 1288–1291.

Holmstrom, L. L., & Burgess, A. W. *The victim of rape: Institutional reactions*. New York: Wiley, 1978.

Jaremko, M. E., Hadfield, R., & Walker, W. E. *The contribution of an educational phase to the stress inoculation of speech anxiety*. Paper presented at a symposium entitled "Stress Inoculation Training: Components, Outcomes, and Applications" at the 25th annual meeting of the Southeastern Psychological Association, New Orleans, March 29, 1979.

Kaplan, H. S. *The new sex therapy*. New York: Brunner/Mazel, 1974.

Katz, S., & Mazur, M. A. *Understanding the rape victim: A synthesis of research findings*. New York: Wiley-Interscience, 1979.

Kilpatrick, D. G. *Cognitive repercussions of rape*. Paper presented at the 14th annual convention of the Southeastern Psychological Association, Atlanta, March 16, 1978.

Kilpatrick, D. G. The scientific study of rape: A clinical research perspective. In R. Green & J. Wiener (Eds.), *Methodology in sex research*. Washington, D.C.: Department of Health and Human Services (DHHS) No. (ADM) 81–766, 1981, 179–192.

Kilpatrick, D. G., Veronen, L. J., & Resick, P. A. Responses to rape: Behavioral perspectives and treatment approaches. *Scandinavian Journal of Behaviour Therapy*, 1977, *6*, 85.

Kilpatrick, D. G., Best, C. L., & Veronen, L. J. The adolescent rape victim: Psychological responses to sexual assault and treatment approaches. In A. K. Kreutner & D. R. Hollingsworth (Eds.), *Adolescent obstetrics and gynecology*. Chicago: Year Book Medical Publishers, 1978.

Kilpatrick, D. G., Veronen, L. J., & Resick, P. A. The aftermath of rape: Recent empirical findings. *American Journal of Orthopsychiatry*, 1979, *49*(4), 658–669. (a)

Kilpatrick, D. G., Veronen, L. J., & Resick, P. A. Assessment of the aftermath of rape: Changing patterns of fear. *Journal of Behavioral Assessment*, 1979, *1*(2), 133–148. (b)

Lang, P. J. Fear reduction and fear behavior: Problems in treating a construct. *Research in Psychotherapy*, 1968, *3*, 90–103.

Lang, P. J. The mechanics of desensitization and laboratory studies of human fear. In C. M. Franks (Ed.), *Assessment and status of the behavioral therapies and associated developments*. New York: McGraw-Hill, 1969.

Largen, M.. A. History of women's movement in changing attitudes, laws, and treatment toward rape victims. In M. J. Walker & S. L.Brodsky (Eds.), *Sexual assault*. Lexington, Mass.: D. C. Heath, 1976.

Lewinsohn, P. M. Clinical and theoretical aspects of depression. In K. S. Calhoun, H. E. Adams, & K. M. Mitchell (Eds.), *Innovative treatment methods in psychopathology*. New York: Wiley, 1974.

Libet, J. M., & Lewinsohn, P. M. Concept of social skill with special reference to the

behavior of depressed persons. *Journal of Consulting and Clinical Psychology*, 1973, *40*, 304–312.

Masters, W. H., & Johnson, V. E. *Human sexual inadequacy.* Boston: Little, Brown, 1970.

McCombie, S. Characteristics of rape victims seen in crisis. *Smith College Studies in Social Work*, 1976, *46*, 137.

Meichenbaum, D., & Cameron, R. *Stress inoculation: A skills training approach to anxiety management.* Unpublished manuscript, University of Waterloo, 1972.

Midlarsky, E. Research on rape: Some methodological considerations. In R. Green & J. Wiener (Eds.), *Methodology in sex research.* Washington, D.C.: DHHS (Department of Health and Human Services No. (ADM) 81–766, 1981, 192–206.

Notman, M. T., & Nadelson, C. C. The rape victim: Psychodynamic considerations. *American Journal of Psychiatry*, 1976, *133*, 408–413.

O'Leary, K. D., & Wilson, G. T. *Behavior therapy applications and outcome.* Englewood Cliffs, N.J.: Prentice-Hall, 1975.

Paykel, E. S. Recent life events and clinical depression. In E. K. Gunderson and R. H. Babe (Eds.), Life stress and illness. Springfield, Illinois: Thomas, 1974.

Peters, J. J. Social, legal, and psychological effects of rape on the victim. *Pennsylvania Medicine*, 1975, *78*, 34–36.

Queen's Bench Foundation. *Rape victimization study.* San Francisco: State of California, Office of Criminal Justice, June 1975.

Resick, P. A., & Jackson, J. *The psychological treatment of rape victims: Past, present, and future.* Paper presented in a symposium entitled "Perspectives on Rape" at the Southeastern Psychological Association Convention, New Orleans, March 20, 1976.

Resick, P. A., Kilpatrick, D. G., & Veronen, L. J. Burgess and Holmstrom's rape trauma syndrome: A methodological critique. Unpublished manuscript, Medical University of South Carolina, 1979.

Saunders, P. J. The victims of rape: A statistical profile. Paper presented at the 22nd annual meeting of the Southeastern Psychological Association, New Orleans, March 20, 1976.

Schwartz, P. The scientific study of rape. In R. Green & J. Wiener (Eds.), *Methodology in sex research.* Washington, D.C.: DHHS (Department of Health and Human Services) No. 81–766, 1981, 145–179.

Seligman, M. E. P. Phobias and preparedness. *Behavior Therapy*, 1971, *2*, 307–321.

Sutherland, S., & Scherl, D. Patterns of response among victims of rape. *American Journal of Orthopsychiatry*, 1970, *40*, 503–511.

Symonds, M. The rape victim: Psychological patterns of response. *American Journal of Psychoanalysis*, 1976, *36*, 27–34.

Vernonen, L. J., & Kilpatrick, D. G. Self-reported fears of rape victims: A preliminary investigation. *Behavior Modification*, 1980, *4*(3), 383–396.

Veronen, L. J., & Kilpatrick, D. G. Stress inoculation training as a treatment of rape victims' fears. In D. Meichenbaum & M. Jaremko (Eds.), *Stress prevention and management: A cognitive behavioral approach.* In press.

Veronen, L. J., Kilpatrick, D. G., & Resick, P. A. *Stress inoculation training for victims of rape.* Paper presented at a workshop on "The Rape Victim: Current Issues in Research and Treatment" at the 13th annual convention of the Association for Advancement of Behavior Therapy, Chicago, November 18, 1978.

Veronen, L. J., Kilpatrick, D. G., & Resick, P. A. Treatment of fear and anxiety in victims of rape: Implications for the criminal justice system. In W. H. Parsonage (Ed.), *Perspectives on victimology* (Sage Research Series in Criminology). Beverly Hills, Calif.: Sage, 1979.

Weissman, M. W., & Paykel, E. S. *The depressed woman.* Chicago: The University of Chicago Press, 1974.

Werner, A. Rape: Interruption of the therapeutic process by external stress. *Psychotherapy: Theory, Research, and Practice*, 1972, *9*(4), 349–351.

Whaley, D. L., & Malott, R. W. *Elementary principles of behavior.* Englewood Cliffs, N.J.: Prentice-Hall, 1971.

CHAPTER 20

Burn Patients

JEANNE ACHTERBERG-LAWLIS AND
CORNELIA KENNER

INTRODUCTION

The multisensory onslaught of the burn ward speaks of abject stress for
both patient and treater. Burn treatment has advanced dramatically dur-
ing the past 30 years, so much so that only approximately 10% of all burn
patients admitted for treatment die and the outlook is good except for
patients with very extensive burns (70% of the body surface or greater) or
for very young or old patients. Unfortunately, the type of treatment
necessary to salvage previously unsalvageable lives is as much a part of
the stressful aura of the burn unit as is the patient's response to the
trauma itself. In fact, burn injury might be one of the few conditions
where patients tend to recall the treatment with more horror than the
trauma itself (Andreasen, Noyes, & Hartford, 1972). For this reason it is
important to begin with some discussion of treatment protocols in order
to provide the context for both the short- and long-term psychological
implications. Following that, the existing research on the psychological
impact and sequelae will be presented, particularly as findings relate to
potential psychotherapeutic involvement. Finally, the few existing (but
promising) techniques for behavioral intervention will be reported. The
emphasis throughout will be on adult burn patients solely because of
space considerations.

JEANNE ACHTERBERG-LAWLIS • Department of Rehabilitation Science, and CORNELIA
KENNER • Department of Surgery, University of Texas Health Science Center, Dallas,
Texas 75235.

STAGES OF TREATMENT FOR BURN INJURY

It is estimated that over two million people are burned each year in the United States alone and that burns rank as the third leading cause of death from trauma for adults. The projected economic impact relates burn injuries to almost nine million disability days per year, with the length of hospitalization and rehabilitation averaging 2 years (Shires, 1979). Currently, a major assessment effort is underway sponsored by the Regional Burn Demonstration Program and conducted at six sites across the country to determine more exacting figures. Preliminary findings from the Texas Region indicate that the incidence and impact might have been considerably underestimated in the past.

The long and costly treatment can be divided into three basic phases: the initial or resuscitation stage, the acute or wound-healing stage, and the rehabilitation stage. Each will be discussed, with a brief description of the typical medical treatment and psychological reactions. Although the reactions are common clinical observations and it is certainly useful to identify and anticipate them, they should neither be expected as inevitable nor forced on the patient. These reactions are well described elsewhere by Miezala (1977).

Regarding the general care of the burn patient, a multidisciplinary approach is necessitated by the complexity of the patient's needs. Not every hospital has the appropriately trained personnel or the facilities to provide care for burned patients. In an effort to coordinate the patient's condition with that of clinical-care staff and facilities, the American Burn Association has developed guidelines for categorizing hospitals. The guidelines are based on a hospital's ability to provide appropriate care for patients with major, moderate, or mild burn injuries (see Table I for descriptions of depths of injury). A person with a major burn injury should be cared for in a burn unit or center. A major burn injury is defined as including one or more of the following: (1) full-thickness (third-degree) injury of 10% total body surface (TBSA) or more; (2) partial-thickness (second-degree) injury of 25% TBSA or more; (3) burns involving the face, eyes, ears, hands, feet, and/or perineum; (4) burns complicated by associated injury such as fractures or soft-tissue injury; (5) inhalation injury; (6) electrical injury; (7) any significant preexisting health problem or extremes of age. A person with a moderate burn injury can be cared for in a hospital with special expertise or in a burn unit or center. A moderate burn injury can be described as full-thickness injury of 2–10% TBSA or a partial-thickness injury of 15–25% TBSA in adults (10–20% in children) not associated with the aforementioned complications. A person with a minor burn injury can receive initial care and be treated as an outpatient. A minor burn injury can be described as a full-thickness injury of less than 2% TBSA or a partial-thickness injury of less than 15% TBSA in adults (less than 10% TBSA in children) without any associated complications.

TABLE I. DEPTH OF BURNS

Burn	Causes	Clinical picture	Areas of involvement	Healing
First degree	Sunburn; flash burn	Red; painful	Epidermis	Within a week
Second degree (partial thickness) Superficial	Flame; flash; hot liquids; hot objects	Pink or mottled red, moist blisters; very painful; edematous	Epidermis; some dermis	10–14 days
Deep		Mottled, dryer in appearance than superficial injuries; waxy white; edematous	Epidermis; large percentage of dermis	30–60 days
Third degree (full thickness)	Flame; prolonged contact with hot liquids or hot objects	Dry, leathery, white, cherry red, or black eschar; edema; painless; visible thrombosed blood vessels	Epidermis; dermis; subcutaneous tissue	Healing cannot occur and skin grafting required

Initial or Resuscitation Phase

Medical Treatment and Physical Response

The period of resuscitation is commonly defined as the first 72 hours postinjury. The medical care delivered to the patient during this critical time revolves around four major goals: (1) attainment of fluid and electrolyte balances; (2) maintenance of pulmonary functioning; (3) prevention or control of infection; and (4) preservation of physical function.

Preliminary to any care delivery is a rapid patient assessment, later followed by a more thorough evaluation. Priorities are established and the principles of emergency management are followed. The patient can have associated life-threatening trauma that demands therapeutic intervention prior to implementation of burn care. The history encompasses the details of the accident including the type of agent, circumstances surrounding the injury, presence of any noxious gases or a closed-space environment, and any significant history of cardiovascular, pulmonary, renal, metabolic, psychiatric, or neurological problems.

In order to attain fluid and electrolyte balance, the primary goal of initial fluid therapy is the rapid and complete restoration of cardiac output. The most reliable signs of adequate resuscitation are normal cerebration and normal urinary output. Other useful signs are a high normal pulse rate; low central venous pressure; absence of nausea, vomiting, gastric dilitation; absence of ileus (a form of gastrointestinal paralysis), and equilibrium in the acid–base status.

In order to maintain pulmonary functioning, an adequate airway is always the first step starting at the time of injury. Obstruction of the upper airway from swelling, spasm, and accumulation of mucus can be seen in the first 72 hours postinjury and necessitate endotracheal intubation or tracheotomy. Lower airway obstruction (respiratory burn or inhalation injury) is usually not clinically apparent until at least the second day postinjury, although the inflammatory changes have occurred during the first 24 hours postinjury. The pulmonary tree is irritated and becomes edematous, and a pneumonitis ensues. Early diagnosis is difficult because admission physical examination findings and the chest radiograph are usually negative. The most reliable criteria are the history and carbonaceous sputum. The patient might also exhibit hoarseness, cough, increased secretions, wheezing, burns of the face or neck, elevated carboxyhemoglobin levels, positive bronchoscopy, delayed clearance on xenon drug scan, and altered pulmonary function tests. Therapy is aimed at adequate oxygenation, vigorous pulmonary toilet, bronchodilators, antibiotic treatment for pneumonia, and pulmonary support with mechanical ventilation if indicated.

The principles of infection control are initiated by paramedical personnel at the scene of injury and are continued until wound closure. Attention to all details of asepsis is important since the patient is ex-

tremely susceptible to infection. The skin, which is the first line of defense from microorganisms, is lost. Bacteria on the surface of the burn would proliferate because the necrotic tissue is an excellent culture medium, and both the delivery and function of humoral and cellular defense mechanisms are impaired. Initial cleansing and removal of devitalized tissue takes place in a scrupulously clean environment. Following this cleansing, the wound is covered with a topical antimicrobial agent, or, in areas of superficial partial-thickness injury, heterograft (or in some instances homograft) is applied. *Heterograft* refers to skin from another species (usually pigskin) that serves as a temporary biological dressing. *Autograft* and *homograft* are terms to describe skin grafts taken from one's own body, in the case of the former, and from a member of the same species (usually cadaver) in the case of the latter term. Homografts, like heterografts, are temporary and are intended to provide protection either to expedite healing or until autografting is possible.

Function is preserved by the early institution of positioning, exercises, and splints. Early positioning, particularly of extremities, is of help in decreasing edema (or swelling), maintaining circulation and the functional range of motion of the joints, and preventing maceration of tissues. Any burned extremities are elevated above the level of the heart with a position change and exercise at hourly intervals. An exercise program is initiated in the first 48–72 hours postinjury and is carried out two to four times daily. All involved joints receive active, active-assisted, or passive exercises. Hand splints to stabilize hands in a normal or functional position are applied early to burned hands for 24-hour wear until the edema is decreased and then often are worn only at night.

Circumferential areas of full-thickness injury are monitored closely for circulation. The underlying tissues swell, but the area of circumferential full thickness burn is inelastic and remains contracted. The area acts like a tourniquet and impairs venous return and then arterial flow. Elevation decreases the edema, but escharotomy is often necessary. An escharotomy is an incision through the entire thickness of destroyed tissue (eschar) so that the underlying viable edematous tissues can expand.

Psychological Reactions during Initial Stage

Immediately following the burn injury and during the early stages of care, many patients are fairly alert and rational; they tend to remember this period as one of mild to moderate confusion. The patient might also be in a state of disbelief, protecting himself or herself from the impact of the injury (Steiner & Clark, 1977). The major area of concern for patients is survival, and they often request repeated assurances on this issue. A "flood" reaction (Miezala, 1978) involving a transitory period of intense and disorganized concern over multiple issues can also occur. The complex family–staff–patient triad of interpersonal relationships begins at this early stage, and good communication at this point seems to pave the

way for maximizing the effectiveness of the interaction. Anxious family members generally request progress and status information at frequent intervals, as well as detailed and repeated information on care delivery. Appropriate explanations, accompanied by illustrations, can be of help in preparing the family for initial visits, especially if the patient is badly burned. At this initial stage, though, the patients themselves usually show minimal, if any, concern for disfigurement or problems of body image.

Acute Phase

Medical Treatment and Physical Response

The period of time described as the acute phase is defined as that interval from 72 hours postburn until healing or grafting occurs. The primary goals during this phase are (1) closure of the wound, (2) prevention or control of infection, (3) maintenance of the range of motion and prevention of contractures, (4) adequate nutritional support, and (5) prevention of supervening complications such as gastrointestinal bleeding.

The foremost medical task is closure of the burn wound. Not until the eschar is removed and the wound is covered by an autograft, or partial-thickness wounds are reepithelialized, are the severe derangements resulting from the open wound reversed. Three approaches are utilized: conservative, aggressive, and a combination of the two. In the more common conservative approach, the wound is covered with a topical antimicrobial agent for prevention and/or control of infection. Daily hydrotherapy (or "tubbing") and wound debridement (removal of devitalized tissue) are employed until the areas of partial-thickness injury heal and areas of full-thickness injury develop granulation tissue (vital tissue containing blood vessels). When the eschar is removed, heterograft can be used as a temporary biological covering.

Aggressive therapy is synonymous with surgery or excisional therapy. The removal of limited areas of eschar at each surgical procedure is followed by autografting or the application of a temporary biological covering. Excision is performed on or before 5 days postinjury before significant bacterial colonization has occurred. Primary excision involves removal of full-thickness injury and wound coverage with autograft or biological dressing. Tangential excision involves removal of partial-thickness injury by shaving away eschar layer by layer until active capillary bleeding (and, thus, vital tissue) is reached.

Prevention or control of infection becomes an extremely important and time-consuming aspect of patient care management during the acute phase. Sepsis is the most formidable complication facing the burn patient. Early clinical signs are a change in mental orientation, increased respiratory rate and depth, glucose intolerance with hyperglycemia and

glycosuria, and decreasing platelet count. Systematically, early sepsis induces a hyperdynamic state. If the infection continues unabated, decompensation and a shocklike state results.

Topical antimicrobial agents are applied to control sepsis but do not prevent it. Still, sufficient time is gained in retarding sepsis so that areas of partial-thickness injury can heal (rather than convert to full-thickness injury as a result of infection) and in allowing the development of granulation tissue that is relatively resistant to bacterial invasion.

Daily wound cleansing and debridement are utilized to remove topical agents, debride eschar and necrotic tissue, and protect developing granulation tissue. Unfortunately, stress and pain accompany the procedure in many instances. Cleansing is accomplished by bed bath, shower, hydrotherapy, or whirlpool, depending on the results of the daily physiological assessment. Tubbing allows for easy removal of the topical agent, softens the eschar so that eschar removal is facilitated, and encourages increased range of motion if the patient is submerged. The disadvantages are significant and include heat loss, stress, and increased risk of both autocontamination and cross-contamination. Daily debridement removes the eschar as it separates. Mechanical debridement can be performed during the bath or immediately following the cleansing procedure and is dependent on the physiological and psychological assessment. The loosened eschar is lifted away from the wound with forceps and removed with scissors. Enzymatic debridement includes the application of an active topical enzyme combined with an antimicrobial agent and seems to be primarily effective in debulking the wound.

Maintenance of range of motion and prevention of contractures are the aims of a daily regimen of positioning, exercise, and splinting. Burned upper extremities are positioned on shoulder boards attached to the head of the bed so that shoulders and arms are abducted. With burned lower extremities, hips are kept straight, knees are extended, and legs are maintained in a very slight abduction (positioned outward). Gentle active and passive exercise is started early. Active exercise and self-exercise regimens are encouraged. Active motion minimizes edema and prevents the adherence of flexor and extensor tendons to surrounding tissues and shortening of capsular structures. Splinting is often necessary to help hold basic positions, maintain functional position, and prevent deformities. Commonly, the patient starts early in the day and participates in an active exercise program three to five times a day. Several short exercise sessions are preferable to one long session. Active exercises can be unlimited, but passive exercise must be done gently because too vigorous a regimen will be harmful. At night, the patient maintains position by wearing splints.

Maintenance of an adequate nutritional state becomes a major challenge for the patient, the family, and staff. The patient exhibits an altered metabolic response characterized by hypermetabolism, severe protein wasting, and weight loss resulting from the stress response and the in-

creased energy expenditure in the wound. A diet high in protein and calories is started as soon as possible during the postburn period. Protein and caloric requirements are calculated weekly. Daily assessments include weight on a metabolic scale, accurate intake and output records, and calorie counts to guide the intake. Often, despite all dietary modes available, the patient is unable to take in the nutritional requirements by oral means. Feedings via a small nasogastric catheter are used to deliver supplemental fluids. If nutritional requirements still cannot be met, parenteral nutritional therapy is implemented.

Psychological Reactions during the Acute Phase

The majority of the clinical investigations on the psychological aspects of burn injury have been conducted in regard to the acute or wound-healing stage. The psychological reactions can be roughly characterized as a withdrawal and a reactive period. The quality, duration, and intensity of these, or whether the stage is exhibited at all, is highly dependent on not only the nature of the injury but also the patient's long-term history of coping-behavior patterns.

Withdrawal. The withdrawal aspect is likely to occur within hours or days after the trauma. It is described as a time when patients enter a "calm, dreamlike state, with little awareness of where they are or what has happened to them. They may talk lucidly but later have no recollection of the conversation" (Andreasen, Noyes, Hartford, Brodland, & Proctor, 1972, p. 65). Hamburg and Adams (1967) termed this stage a period of *constriction*—a time during which all mental processes aim at the reduction and avoidance of sensory input in order to minimize the impact of the injury. It is also suggested that having had no opportunity to prepare for the drama of the injury through "worry work" the patient might be buying time in order to prepare for the psychological management of the losses. The quiet interval when interactions are reduced can then be a substitute period created after the fact. This syndrome has been noted in other instances of abrupt stress, such as heart attack.

Seligman (1974) further delineates the withdrawal period into adaptive and maladaptive types. Although she relates these specifically to burned children, the observations appear to be equally relevant to adults. The adaptive type is referred to as *conservation-withdrawal* and the maladaptive type as *depression-withdrawal*. The former is an attempt to conserve energy necessary for survival and calls for "benevolent neglect." Attempts at interfering with the process run counter to the messages the patient receives from body systems indicating necessary behaviors for survival. Seligman suggests that the overstated generalizations one frequently is confronted with regarding the need for the patient to deal with emotions and face reality, when acted on, can result in only more regression and withdrawal. On the other hand, similar behaviors of withdrawal are exhibited from highly depressed patients who apparently do not have

the resources or will to survive, and the depression is followed by hopeless despair and eventually death. She stresses the need to carefully assess which type is operative, as for the latter type psychological intercession might be mandatory if life is to continue. Surely, the ability to discriminate borders on a fine art and is the product of enhanced awareness and experience on the part of the therapist.

Reactive phase.   Following the period of withdrawal, or conservation of energy or physical or emotional quietness, the patient can gradually become attuned to the reality of continuing life in circumstances that have been dramatically altered by the burn. Frequently, family members have also been injured or have died, possessions have been lost, and future employment looks bleak. Of more concurrent concern, however, is the extent of the physical damage, the potential disfigurement, and the constant pain and discomfort that are invariably associated with treatment.

Emotions and behaviors during this period run the gamut of human expression, engendered and aggravated by each patient's personal history. Fluctuations in coping style vary both intra- and interindividually, and the variety of affective behaviors encountered contributes to the complex stressful situation in the ward. Instances of regressive behavior, hostility toward staff, dependency and autonomy, hope and confidence, unrealistic thinking, poor impulse control, and immaturity are reported during this period (Miezala, 1977). Steiner and Clark (1977) liken the responses during this stage to a kind of uncomplicated grief that begins when the magnitude of loss is realized and survival is assured. "This transition from denial to recognition develops in a series of approximations until a complete understanding of reality is achieved . . . the mourning process proper begins and continues in spite of brief periods of regression and depressive symptomatology" (p. 136).

The primary response during this stage is intimately correlated with the pain constantly inflicted on bodies in the name of rehabilitation of optimal function. Virtually every person in the treatment milieu inflicts incredible pain, described as "something dry-stripping me" and "1,000 times worse than the burn." There is no escape, no control, for weeks and months. Small wonder, then, that every emotional resource the patient has available must be drawn upon and that the depth and breadth of the behavior repertoire is evidenced during this treatment phase not only by the patient but by families whose lives are turned topsy turvy and by staff who must creatively interact with the total family structure.

In order to construct reality in an orderly cause-and-effect fashion, many patients who have suffered major burns begin to identify causative factors in the injury. In a group of 107 patients we interviewed during the acute stage, we asked who or what caused the accident (actually a contradictory proposition, since accidents by definition are unintended). Of these patients, 35% replied that they, themselves, were responsible, another 19% blamed another person, 23% attributed it to machinery, and

4% to fate; 19% ascribed it to "other." When asked whether it was really accidental, 82% said yes, but 12% stated that it was neglect, and 6% stated the accident was on purpose. (Most of the latter were criminal-assault cases). Finally, we asked whether they thought they deserved what happened, and 81% soundly replied "definitely not," 7% were uncertain, but 12% were "probably" or "definitely" certain that they had somehow courted their fate.

Whether patients blame others or themselves or attribute the burn to God's will or just plain bad luck, the object of the attribution might need to be dealt with repeatedly. An 18-year-old who sustained a 70% burn, for example, blamed the explosion of a gas can on his older brother. His brother was not in the vicinity at the time, and, yet, he believed his brother had moved the can close to the water heater and that that was the cause of the accident. This was not particularly rational, perhaps, but his repeated vociferous anger toward his sibling required attention throughout his hospitalization. At least as distressful a situation occurs when patients blame themselves for the fire, whether or not the blame is warranted. A young oil field worker was the only one of three of his friends to survive a fire that occurred as a result of an equipment failure. The fire was freakish and scarcely could have been averted except by a nonroutine inspection. But the young man firmly maintained that he had a hunch something was wrong and that, had he followed his instincts, the tragedy might have been avoided. Such guilt is not readily resolved.

Fires and burn injury do not normally occur in country club surroundings. They happen to the very young and very old who are defenseless, to the poor who exist in substandard situations, and to the blue-collar working class whose jobs contain an element of danger. They occur not only as a result of "accident" secondary to carelessness but also from deliberate abuse or assault. In short, they do not happen in pretty circumstances, and the psychological reactions following the trauma might be thought of in the context of a continuation of a series of behaviors born of repeated stress. One study, in fact, quantified stressful events prior to the burn and noted a significant increase in stressful life events during the year preceding burn injury (Noyes, Frye, Slymen, & Canter, 1979).

The hopelessness and helplessness that is frequently observed by treaters can be a long-term product of sensing little control in life and events and, instead, feeling manipulated by chance or by more powerful others. The responsibility for the injury is projected on these elusive factors.

However trite, the empirical truism is that a personality does not spring forth in full bloom after an injury. Particularly as physiological equilibrium is reached during this acute phase, the successful defensive tactics of the past are reenacted. Patients who have encountered previous stresses and adaptively managed them are likely to do so again.

However, the issue of just what does constitute a healthy emotional response to a major burn during the acute stage must be considered.

Often, the response most highly desired by the hospital staff is passivity and compliance. Yet, as one 15-year burn team veteran told us, "The mean and ornery ones give us a lot of trouble, but we know they'll be the ones that live."

Our traditional psychological approach of "breaking through" defense mechanisms and countering negative emotions often has to be left aside with the realization that their maintenance might be necessary for survival. The adrenaline that flows with anger and the protective mantels of denial and repression can direct or conserve energy for recovery.

During the acute period health team members are apt to define problems as psychological in etiology when, in fact, what they are observing are reactions secondary to physiological alterations. For example, altered mentation can be related to early sepsis, electrolyte imbalance, or sleep deprivation. The latter, particularly, deserves more attention and study in terms of its consequences on the patient's mental and emotional status. Hospital routine, pain, the necessary nighttime positioning, all take their toll, and sleeplessness remains a constant complaint for which no ready relief is available. The usual medications for pain, anxiety, and sleeplessness provide only partial solutions to these problems, which are encountered constantly by the patient during this stage of treatment.

Rehabilitative Phase

Medical Treatment and Physical Response

The rehabilitative (reconstructive or convalescent) phase is defined as that interval in the patient's treatment after grafting. Patient care management during this lengthy period (six times as long as the acute phase) entails (1) preservation of new tissue, (2) prevention of infection, and (3) attainment of optimal range of motion, strength, and functional ability.

Preservation of new tissue becomes a highly important goal during the rehabilitative phase because both motion and functional ability can be significantly decreased by persistent problems with blister formation, skin breakdown, and skin dryness that can even lead to early cracking and increasing amounts of hypertrophic scar formation. (Hypertrophic scars are tissue that has "overhealed" and appears as prominently raised reddened scar tissue.) Graded amounts of pressure on the skin are useful to desensitize skin preliminary to the wearing of pressure garments. Prevention of infection remains important not only in connection with surgical techniques, but also with daily wound care.

Attainment of optimal range of motion, strength and functional ability is achieved by an individualized, planned, and sequenced program of exercising and splinting. As the healed skin matures, hypertrophic scars can develop. The burn wound can yet contract over an extended

period of time. Healed areas are kept lubricated to maintain softness, pliability, and flatness. Gentle sustained stretching techniques are used to slowly lengthen the scar bands and increase range of motion. Active exercises to increase strength are initiated. Splinting is useful to prevent deformities, decrease hypertrophic scarring, and alter or perhaps even prevent extensive reconstructive surgery.

Primarily in patients with major burn injury, repeated reconstructive procedures are necessary to improve both cosmetic appearance and functional ability. Patients and family are sometimes overly optimistic about what can be attained with surgery. Later, they can be discouraged with the multiple procedures that make small improvements and decide to rely on techniques as the precise application of cosmetics rather than continue with the surgical approach.

Psychological Reactions during the Rehabilitative Stage

The most understudied phase of burn treatment in terms of social and psychological outcome (and, in truth, functional outcome as well) is this last period. For these months, or even years, recovery and reintegration into an adaptive life-style is contingent on the patient's own resources. A significant factor in and of itself is the length of time it takes to recover following burn injury. Many patients might have had few psychological resources even prior to the burn. The most typical burn patient, the young, male manual laborer, might have lost his looks, his strength, his job, and consequently all his sources of pride and machoism. Marital difficulties can begin as his wife, as well, reacts to the loss yet cannot permit herself to admit any feelings of revulsion or disdain. Substance abuse can become a problem, not necessarily (in our opinion) because of drugs administered during hospitalization but because alcohol and drugs can temporarily blot out the reality of an altered self-image. Another source of mental anguish resides in a pending litigation or insurance settlement that can take years to resolve. Observations of the effects on a patient's mental and physical status of this event are far beyond the scope of this chapter. It is sufficient to say that a financial settlement is a complex motivator, and, yet, it is precisely because such settlements are given (and often deserved) that many burn patients are able to begin a new life with pride and integrity and a feeling of having a wrong toward themselves equalized.

Andreasen and Norris (1972), in the one existing study of long-term psychological adjustment, found that, in the 20 patients studied, 30% had a notable adjustment problem related to work capacity, strength, and interpersonal relationships. Failure to adjust in any one of these areas was related to amount of deformity, degree of immaturity, narcissicm, sex (females fared worse), and attitude toward covering scarred areas. An interesting position taken by these investigators is that the burn patient during the rehabilitative stage encounters an identity crisis similar to the

kind described by Erickson (1968) as encountered by adolescents. The burn patient is at a turning point, a moment "when development must move one way or another, marshalling resources of growth, recovery, and further differentiation" (p. 14). We are reminded, once again, of the occasional positive aspects of trauma. One can encounter a crossroad, and, with help, encouragement, and support, new milestones can be reached. A 25-year-old patient with an electrical burn, a double amputee, exemplifies this point well. Injured while working on a high line, he continued throughout treatment to express his belief that he was superb at whatever he decided was important to him. He was the father of two young children, the husband of an understanding woman, and he utilized a financial settlement to educate himself to his fullest potential. His pole-climbing days were comfortably dealt with and regarded as an impetus to further growth.

The alternative pathway, remorse, perpetual and unresolved mourning for a lost identity, and blame and anger toward treaters, is also observed but, fortunately, less frequently. A case in point is a 28-year-old woman who, objectively, was less disabled than the double-amputee patient discussed above but who did sustain visible, disfiguring burns. She had continued in her preinjury profession as travel consultant, yet spoke publicly of her right to die. She spoke of a right that had been thwarted, she believed, by a crack burn team who had their own egos to deal with; the saving of an 80% burn was, she thought, balm for their own needs. She had pleaded for death and felt the militant surgeons ignored her—scarcely aware of the monstrous life they had forced on her!

When Survival Is Unprecedented—the Right to Die?

The last case study alludes to complicated issues of human rights. Certainly these are brought no closer to the fore than in instances of individuals who are led back into the paths of life against their will. Strangely, though, it might be their perpetual anger—anger that continuously requires one more battle to absolve—as well as the skill of the burn team, that allows survival against all odds.

Conversely, there is a segment of burn patients who, according to all available evidence, have zero chance of survival, based on indices such as the National Burn Information Exchange Survival Analyses Diagrams. (This index is based on age and percentage of body surface area burned.) The most heroic measures are likely to lead to only slight prolongation of life, at the expense of significant discomfort for the patient. In the highly unlikely eventuality that the patient should survive, life would be fraught with severe and permanent disfigurement and disability. Many would feel that the choice to live should be made by the patient. But that is a very unpopular premise in the world of burn care. The leading defender of this position is a burn surgeon, Bruce Zawacki (Imbus & Zawacki, 1977). He and his co-workers take care to identify those patients for whom

survival is unprecedented. During the first few hours of hospitalization, when lucidity generally prevails, the patient is given clear information on his or her condition and then allowed to choose between a full therapeutic, aggressive regimen and ordinary care. With the latter, comfort would be assured, but fluid resuscitation and other measures geared to save or extend life would not be attempted. Of 748 dispositions in their burn center, 108 of the adults died. Only 22 of the nonsurvivors were deemed as having injury without precedent of survival, and, given the choice, only three chose full treatment measures.

The legal and ethical rights of patients present a complicated picture in these critical-care situations. The medical model, and the very foundations of the training of medical personnel, rest on assisting patients to live, not die. The problems emanate from the prevailing attitude, solidified in statutes, laws, and hospital policies, that once admitted to a hospital extremely ill patients basically abdicate all rights in decision making and, as Kübler-Ross (1969) points out, are even treated as if they have no right to an opinion. In unprecedented-survival cases, allowing the lucid patient his or her immediate path is surely less controversial an issue than the other cases—the larger burns with minimal chance of survival. These cloud the issue but certainly provide fodder for moral debate and concern.

Perhaps Zawacki's position will gradually be extended even to the less clear-cut cases as the health consumer begins to realize current demands for a greater voice in selection of health care providers and medical protocols, and in the choosing of circumstances and surroundings of death. Surely, signs of this are the popularity of the "living will" (which uncategorically states that excessive measures not be used to extend life) and the growing concept of hospice, which allows dying comfortably without the interference of medical measures designed for a minimal hope of cure or to prolong living. Imbus and Zawacki (1977) imply that ethical decision making in the intensive care unit is inappropriate when conducted by committees who allegedly convene to explore the best interests of the patients, without necessarily asking those patients or their relatives for an opinion: "It seems inevitable that more and earlier communication with the patient will prove to be the most honest and compassionate answer to many of the remaining problems of ethical decision making in the intensive-care unit" (p. 310). "When dealing with an alert, competent patient, one need not struggle against distractions and prejudice to imagine what the patient wants; one needs only to ask. Who is more likely to be totally and lovingly concerned with the patient's best interest than the patient? Whenever in the past we as caregivers tried to decide these matters for patients, issues such as what was best for the morale of the nursing service or for the solvency of the hospital constantly clouded our judgment". (p. 309)

On the other hand, the medical arguments are for commitment to life and the best quality of life that can be accomplished for the individual

person. Many health care deliverers identify fallacies in data-collecting protocols and thus feel that current statistics lack accuracy. Among other factors, they point out that survival is intimately related to the quality of care provided. Others cite case reports from their clinical experience that have defied the odds—severely burned patients who not only have survived but have stated several years later that they were glad to be alive.

Several searching questions spring to the forefront of the debate. How is lucid defined? Can one, following a mammoth total-body assault, be rational enough for decision making? What is the staggering effect on the patient when confronted with such life-and-death questions? What is the effect on the patient of the self-fulfilling prophecy? What special power is yielded by the combined effect of the patient and staff working together to maintain life? What is it that focuses the patient's energy on survival? In any event, the dilemma is far-reaching and is no doubt grappled with by each burn team member.

REVIEW OF PSYCHOLOGICAL RESEARCH ON BURN-INJURED PATIENTS

The term *research* in this section is used loosely. Except for the rare instances to be cited below, the sparse existing psychological research on burns involves neither the manipulation of any variables nor the objective measurement of observations. Both, obviously, would require unusual involvement of researcher and patient during the drama of medical intervention that occurs during the initial (resuscitation) and acute phases of treatment.

Further, many of the original reports stemmed from psychiatric orientations designed primarily for a mental health, psychodynamic model of functioning. The subtle mind–body alterations, behaviors, and life-style changes that occur with disability are often lost under the rubric of *psychiatric complications*. The reports are nevertheless informative, and the observations of those who have carefully observed and interviewed provide a foundation for further study and psychological intervention.

Incidence and Related Issues

The first reporting of the psychological and emotional impact of burns occurred following the Cocoanut Grove fire disaster in 1942 (Adler, 1943; Cobb & Lindemann, 1943). These investigators agreed that approximately 50% of the patients studied evidenced "neuropsychiatric problems" including organic brain syndrome, delirium, anxiety , fear, depression, grief, and bereavement. Within 9 months, however, all but about 12% were free of these problems. Both studies were based on psychiatric interviews, and no demographic, epidemiological, or medical information

was included so that those at high risk for continued problems can only be guessed. Attention was focused on the issue, though, and some of the problems were delineated for the first time.

In surveying the literature published after the Cocoanut Grove incident, what one finds is a highly variant incidence of psychological complications. The general conclusion is that short-term, psychological sequelae were observed in the majority of the patients, whereas long-term consequences were noted in fewer than half of the cases studied. Kjaer (1969) noted that "psychiatric factors" are present in all burn injured patients. Hamburg, Artz, Reiss, Amspacher, and Chambers (1953) reported that, although 58% developed emotional problems, even 60% of those who had adjusted well experienced intermittent periods of disturbance.

The work conducted by Andreasen and her colleagues at the University of Iowa represents the most systematic attempt to deal with the complex psychosocial involvement of burn patients published thus far (Andreasen et al., 1972; Noyes, Andreasen, & Hartford, 1971). In studying 11 patients with an average of 47% TBSA burn, it was stated that nearly all had emotional difficulties. In another survey of 32 patients with less severe burns (average 29% TBSA), it was found that 50% adjusted poorly, with three factors primarily associated with the difficulties: (1) extent of burn, with patients having injury greater than 30% TBSA most likely to have psychological problems; (2) premorbid psychopathology; and (3) prior physical problems. Andreasen's group has also investigated long-term consequences of burn injury (as was discussed in a previous section) and found that, after an average of 2.3 years postburn, 30% were observed to still have psychiatric complications.

Psychological assessment of patients has been rare; even investigations during the rehabilitation stage have utilized interviews exclusively. An exception has been the work reported on 25 patients who were given the Wechsler Adult Intelligence Scale (WAIS) and the Minnesota Multiphasic Personality Inventory (MMPI) during hospitalization (Miller, Gardner, & Mlott, 1976; Mlott, Lira, & Miller, 1977). The results showed moderately improved function over time, but the patients in general did not evidence the emotional and intellectual trauma that had been anticipated in view of Andreasen's and other findings. Miller et al. (1976) stated in regard to the MMPI changes from the time tested during hospitalization to 1 year postdischarge that patients had a good self-concept, were mature, enthusiastic, and had varied interests. They also observed that the patients evidenced a greater tendency to give socially approved answers regarding self-control and moral values, a loosening of depression, moodiness, and self-criticalness, and a slight increase in bodily preoccupation from pre- to posttesting. Follow-up interviews led the investigators to conclude that no significant change in life-style occurred. Based on these results, it would seem that long-term psychological inter-

vention for burn patients is an issue of moot concern, at least for patients within the 25–30 TBSA category included in their investigation. Or perhaps the MMPI, designed to measure psychopathology, is an inappropriate measuring tool for the detection of complex reactions of trauma and disability.

In some cases, the burn incident appears to have strengthened relationships. Andreasen, Norris, and Hartford (1971) state that the long-term prognosis for most burn patients is quite good, with family relations generally affected positively rather than negatively. Further, though more hesitancy was expressed about interacting with strangers, not one patient of the 20 in their study chose to withdraw from interpersonal relationships altogether. Women and members of either sex who place a high priority on appearances (Andreasen & Norris, 1972) and those with facial disfigurement (Chang & Herzog, 1976; Solnit & Priel, 1975) fare worse in terms of adjustment. Steiner and Clark (1977) found the presence of premorbid psychiatric diagnosis, TBSA, and age to be highly correlated to psychiatric complications in their sample of 35 patients. However, the interaction between TBSA, deformity, and long-range adjustment problems remains unclear and disputed. Andreasen and Norris (1972), for example, found no correlation between self-assessed level of deformity and adjustment problems, and Weisz (1967) found that neither the extent nor the severity of the burn injury was a reliable prognostic index of later emotional disturbance.

Psychological Problems

The myriad problems encountered by the burn patient stand in sharp and quizzical contrast to the reports cited above of rather good long-term adjustment by the burn injured. One can, perhaps, conclude that the "human spirit" does indeed triumph after all (or at least 70% of the time), given the least opportunity to rebound toward normalcy.

The problems marshaled are those primarily observed during the acute-care stage (again, the stage most carefully studied). Interestingly enough, in most hospitals this is the time when psychological support personnel are most scarce, and when they do appear on the scene their services must be carefully sandwiched between the continuous physical manipulations of dressing changes, debridement, physical therapy, occupational therapy, and repeated examinations—all of which have priority in hospital routines. After release from hospitalization, if one is to agree with the few available reports on psychosocial aspects of rehabilitation, patients frequently do "well" without psychological or psychiatric intervention.

Delirium is a frequent psychological complication observed during the early stage after injury and is often secondary to physiological complications described earlier (Kjaer, 1969; Noyes et al., 1971; Weisz, 1967).

Estimates of incidence vary from 20% (Miller *et al.*, 1976) to 55% (Andreasen, 1974; Andreasen, Noyes, & Hartford, 1972; Andreasen, Noyes, Hartford, Brodland, & Proctor, 1972; Noyes *et al.*, 1971).

Anxiety reactions and fears have been identified by virtually every writer on the subject, with the range extending through the infinite expanse of human experience. Fears of death (initially), of deformity and disability (later on), and of rejection from loved ones are frequently cited. They are manifested in nightmares, in recurrent fantasies, and in emotional lability. Men who have not allowed themselves to cry since adolescence become intensely sensitive and teary, with mood swings forced by their anxiousness for the future compounded by the defenselessness produced by ongoing treatment.

To no one's surprise, depression is commonly reported in burn patients. It is not only consider common, but even normal (who would not be depressed?). Severe depression, characterized by apathy and loss of will to live, is less common (incidence is approximately 20% according to Andreasen's several reports cited above). She and her colleagues, as well as others (Davidson & Noyes, 1973; Hamburg, Artz, Reiss, et al., Amspacher & Chambers, 1953; Weisz, 1967) also observed severe regression and marked dependence not infrequently.

Other problems reported on with less frequency include a dependency–rebellion syndrome (Pennisi, Deatherage, Templeton, & Capozzi, 1971), phobic neurosis (Andreasen & Norris, 1972), psychosis (Hamburg, Hamburg, & deGoza, 1953; Kjaer, 1969; Quindlen & Abram, 1969; Weisz, 1967), sexual dysfunction (Andreasen *et al.*, 1971; Hamburg, Artz, Reiss, Amspacher, & Chambers, 1953; Hamburg, Hamburg, & deGoza, 1953), and anger and hostility (Davidson & Noyes, 1973).

At the core of many of the behavioral responses and potentiating (if not triggering) the emotional issues discussed previously is the pain experience described as the burn patient's daily companion (Andreasen, Noyes, & Hartford, 1972). Although the type of pain experience changes throughout treatment, the severity is most noteworthy during the acute phase. Fagerhaugh (1974) describes the unique features of burn pain as its intensity and duration. Pain emanating from the open burn wound itself ceases only when the skin heals or wounds are completely grafted. Dressing changes, debridements, and physical therapy also involve intense pain, as do the donor sites involved in the grafting procedures. Noyes *et al.* (1971) report that analgesics bring only partial relief during these procedures.

The measurement of pain is subjective and qualitative and is certain to remain so, despite a long history of attempts at quantification. The pain experience is dependent on an infinite and unknown set of variables acting on the patient, creating not only differences among patients but within any one patient, as tolerances fluctuate daily and maybe hourly. Hamburg and colleagues early emphasized that comparable burn injuries

are by no means equal in terms of individual pain experiences. They also noted that the physical aspects of pain are less severe and the emotional aspects more severe than typically believed. They and others (Artz & Moncrief, 1969; Fagerhaugh, 1974) agree that the interpretation or appraisal of pain is an important part of the burn experience, often situationally dependent, and patients are frequently unable to discriminate pain from discomfort and "emotional" pain from "physical" pain. Beyond these observations, pain has not been well studied in burn patients, though has received attention in general (see Chapter 11, also Sternbach, 1974; Weisenberg, 1975, 1977).

INTERVENTION STRATEGIES

The methods of intervention with burn patients can be crudely categorized as those designed to relieve the emotional aspects associated with burn injury and those specifically developed as pain intervention strategies. The dichotomy is truly false, however, because the physical pain and emotional distress are scarcely separable, particularly in the phenomenological experience of burn patients. Also, pharmacologic as well as psychological (or behavioral) approaches are used for the relief from distress of either psyche or soma.

Medical Management Strategies

Pain and stress remain ever-present concerns for the patient, as well as the nursing staff who are faced with the continuous need to interact with and ameliorate the discomfort. Nevertheless, very little is written about medical interventions per se. Pain and stress are usually discussed tangentially, if at all, in texts, symposia, and other avenues of burn management. Indeed, only few burn centers even have a written protocol for pain management.

The use of pharmacological agents remains controversial in burn care and is unresolved by adequate clinical trials. The recommended strategy, in terms of analgesics, has simply been to advise that "adequate" amounts of analgesics be administered (Andreasen, 1974; Fagerhaugh, 1974). Caution is sometimes advised in the administration of these agents, because pain is of long duration. However, most feel that the risk of addiction is minimal, except for previous substance abusers. Because few clear-cut statements can be made about analgesic administration, the best that can be stated is that use must be individualized for each burn patient with administration contingent on several factors in treatment.

Early postinjury, for example, a great amount of discretion should be exerted in the use of narcotics. During this period, the patient might be suffering from shock and perhaps from hypoxia. Complaints might or

might not be appropriate, and can be due to low circulatory status. Once fluid resuscitation therapy is underway and an adequate patient response has been demonstrated, it is believed that complaints of pain or discomfort are more likely to reflect the actual experience of the patient. When circulation is disturbed in any manner, narcotic analgesics are administered in small doses intravenously. Soft tissue perfusion is decreased as a result of the low flow state and the edema, so intramuscularly administered medications would be absorbed irregularly.

Patients with partial-thickness injury have exposed nerve endings and suffer a great amount of pain. Covering the wounds with a clean sheet or antimicrobial agents decreases the movement of air across the injured area and, thus, significantly decreases the pain. Patients with primarily full-thickness injuries do not complain initially of extreme amounts of pain because the nerve endings have been destroyed. Staff members, however, tend to react to these massively injured patients with a desire to medicate, not realizing that the amount of pain the patient is experiencing at that time is not nearly as great as they imagine.

A rule of thumb for administering narcotic analgesics for pain relief during hydrotherapy and debridement is that they should be given time enough before treatment is initiated to be effective during the treatment. Repeated medication might be necessary if the treatment period lasts longer than the usual 20–40 minutes. Many patients feel that the medication offers only minimal relief during treatment and prefer to have the medication administered afterward. They feel that the effects on lingering discomfort are of more benefit. Short-acting agents (e.g., Ketamine) are being used increasingly in burn centers for dressing changes. However, aberrant responses such as hallucinations can complicate the agent's effectiveness. Minor analgesic agents such as Talwin have a limited use with the burn patient and are primarily useful with less severe pain. A particular disadvantage is that they tend to produce a decreased muscle tone that can lead to failure of the stomach to empty appropriately.

There is a great deal of controversy over the use of tranquilizers. Proponents for their use state that the anxiety state is harmful to the patient both physiologically and psychologically and that the anxiety is decreased by the use of tranquilizers. Opponents of the use of tranquilizers believe that the effect of drug is actually harmful to the patients. They are not able to actively participate in the treatment regimen, and their mental status can be blunted, making a physiological assessment inaccurate. For example, one of the best clinical signs of early sepsis is an altered sensorium, and that monitoring sign is difficult to assess in the face of pharmacologic-agent administration.

Hypnotic drugs are important in inducing sleep for many patients. The hospital environment is not conducive to sleep, and the agents are helpful in connection with other established techniques for promoting it. An axiom of treatment is that those people who receive adequate

amounts of rest and sleep are better able to participate in the plans for getting themselves well.

Psychological Management Strategies

There seems to be little question in surveying the burn literature that the management of emotional and behavioral problems is vital in burn care and that these psychological issues are intricately related to rehabilitation and recovery. The use of counseling and psychotherapy as valuable adjuncts to medical treatment is implicit in virtually every report thus far cited. With the few exceptions, the details of the therapeutic techniques or counseling strategies are not given and can only be surmised by descriptions of case reports and terminology used to describe dysfunctions. The earlier reports on psychosocial aspects of burns had a heavy psychodynamic flavor, as one might expect from the psychiatric orientation of the authors. From our own experience over the last few years, both on the burn unit and in conversing with colleagues, no particular modality appears to be selected over another. "Counseling" appears to encompass the diffuse, nondirective or supportive approach to dealing with disability as well as the more mechanistic behavioral strategies. Counseling is by no means conducted only by those trained in that field but also by nurses and allied health personnel (physical and occupational therapists, social workers, nutritionists, and so forth) all of whom can have extended and daily contact with the patients.

The suggestions for dealing with the problems, though apparently emanating from valuable clinical experience, have generally been unsystematically applied and vaguely presented. The more concrete suggestions given in the literature include admonitions that physician–patient–family communication is important for patient comfort (Andreasen, Noyes, Hartford, Brodland, & Proctor, 1972; Cobb & Lindemann, 1943; Hamburg, Artz, Reiss, Amspacher, & Chambers, 1953; Hamburg, Hamburg, & deGoza, 1953), that information exchange can do much to alleviate fear, and that the physician should anticipate questions and answer them directly and with reassurance. Group therapy and/or individual psychotherapy have been proposed by most authors. Others offer more directive advice on setting limits with patients who exhibit regressed behavior (Andreasen, 1974; Kjaer, 1969) and state that patients should be encouraged in every way possible toward independence by being allowed to do things for themselves. Participating in treatment, such as dressing changes, is often proposed to give a sense of responsibility and control. Other suggestions pertain to the hospital milieu itself and involve the presence of diversions such as television and games to distract the patient from the unpleasantness of the recovery process (Artz, 1965; Weisz, 1967).

The single nonpharmacologic technique most frequently discussed in the burn literature is hypnosis. Crasilneck, Stirman, Wilson,

McCraine, and Fogelman (1955) were among the first to publish on this topic. They believed hypnosis to have perhaps even life-saving attributes. In a study of eight patients, pain was apparently relieved (although they present no documentation for this), nutrition was improved, exercise was facilitated, and improvement in morale were noted. Most unfortunately, these authors maintained a mysterious cloak over their procedures, as well as their outcome measures. Given the wide variance in so-called hypnotic procedures, full disclosure in the literature would seem crucial for the advancement of knowledge in this important and obviously effective approach.

Another case report is that of Bernstein (1965) with pediatric burn patients. He suggested that analgesic and improved nutritional status in three of his four patients were probably a result of enhanced morale made possible through the therapeutic relationship rather than the result of direct hypnotic suggestion. His case studies, which emphasize the effect of hypnosis on the patient, also highlight the positive changes in staff attitude when the technique is instituted. Other findings are those of Dahinterova (1967) and Finer & Nylen (1961), who reported variable but generally positive findings, and Schafer (1975), who reported that tape-recorded hypnotic suggestions were effective in reducing pain during dressing changes.

The only adequately controlled study of hypnosis with burn patients is that of Wakeman and Kaplan (1978), which shows similarly positive findings. Two groups were included: 24 patients with 0–34% burns and 18 patients with 31–60%. Both studies report significantly ($p < .01$) lower percentages of medication used by the hypnotic groups. Techniques included both therapist-induced and autoinduced hypnosis. The patients were accompanied by the therapist during procedures until self-hypnosis was mastered. Not only do the authors report induction procedures, but they also give an example of a typical dissociation discourse so that subsequent clinicians might profit from their experience. They additionally report that the children and adolescents in the study did significantly better than the adults. Presumably this is because children usually have richer fantasy skills and are less defended psychologically.

An interesting sidelight from this study is that all patients were allowed ad lib selection of narcotics. They selected both type and frequency of dosages. Medication requests were carefully monitored and only two patients were dropped from the study for abuse medication. These two had histories of narcotic addiction, and abuse was anticipated.

Although it is frequently stressed that relaxation aids in the relief of both anxiety and pain, only one study appears to have dealt specifically with this approach (Cromes, Robinson, & Turrentine, 1978). Relaxation obviously is an integral part of hypnotic procedures and, in fact, might be a key aspect in the analgesic properties of autohypnosis, particularly. These investigators administered burn patients a tape recording of relaxation instructions, whereas a control group heard a tape of lectures on

health habits. Two training and two treatment sessions were conducted. Both psychological and physiological measures of anxiety were taken. Although the relaxation group was found to be significantly less anxious psychologically during training sessions, the differences were not maintained during painful treatment regimens. The physiological differences, however, were maintained during treatment by the relaxation group and not by the control group.

In a single-case study by Weinstein (1976) reported the use of relaxation plus imagery with a 10-year-old burned child. The two procedures were used to desensitize the child to the hydrotherapy and to allow the acquisition of a coping response. The patient was instructed to visualize events that elicited a positive emotional response. The *in vivo* desensitization took place, apparently involving presentation of components of the feared experience. The usual paradigm rests on the assumption that fear and relaxation are physiologically incompatible and that when elements of a feared situation are gradually imaged during relaxation, the fear itself is attenuated.

Another approach using relaxation and visual imagery for burn-injured patients is presented by Achterberg & Lawlis (1980). They provide a modification of similar techniques they had used previously for pain and for cancer (Achterberg & Lawlis, 1978) whereby the patients are instructed in relaxation procedures and then are given information on wound healing, allowing for the development of vivid and positive mental pictures. Their process is specifically intended for the three postgraft days, when patient cooperation and motivation are essential to graft take, and quietude is important. Patient education (about the graft itself), desensitization, and relief of discomfort via muscle relaxation are goals of the procedure.

A modality having logical potential for pain and stress relief during burn care is biofeedback. Regrettably, the effectiveness of this procedure with burns remains anecdotal and largely hearsay. Knudsen (Personal Communication) has a systematic study underway and recently stated that diazepam (Valium) plus relaxation procedures prior to hydrotherapy led to a "beautiful response."

A final behavioral strategy reported in the burn literature is behavioral contracting (Simmons, McFadd, Frank, Green, Malin, & Morris, 1978). Behavioral contracts are used to alleviate certain kinds of behavior problems, particularly those instances where the behaviors interfere with recovery. The chief purpose is to enlist the cooperation of the patient and to afford him or her as much control as possible. According to these authors "all contracts aim to increase and reinforce behavior which strengthens the patient's role as participant caretaker and to mobilize both the patient and staff around common and explicit goals" (p. 260). Problem behaviors amenable to contracts include such counterproductive acts as refusal to eat, insatiable demands for pain medication, stalling, bargaining, soiling, or lying. The procedures include (1) identifica-

tion of a problem behavior, (2) identification of reinforcers or incentives for change, and (3) writing a specific contract to be signed by the participants that cites behaviors targeted for change, amounts and kinds of reinforcement, schedule of reinforcement delivery, and consequences for nonperformance.

Sound, established behavioral approaches that have been utilized in other situations would be profitably and admirably applied to many facets of burn care. For example, behavioral modification tactics developed for anorexia nervosa would likely be effective with burn patients whose caloric requirements escalate at the same time that appetites diminish. Reinforcement schedules in conjunction with appropriate participation in occupation therapy and physical therapy might well enhance the quality and amount of response during these painful, aversive procedures. Psychological approaches designed to help delineate rational versus irrational beliefs and cognitive restructuring techniques could be employed to assist patients in facing altered self-images and life-styles that are virtually inevitable consequences of major burn injury.

The Burn Team

The integration of a psychologist in the burn team effort has been reported in a context of rehabilitation (Helm, Head, Pullium, O'Brien, & Cromes, 1978) at Parkland Memorial Hospital, Dallas, Texas, and as part of a multidisciplinary mental health team (Morris & McFadd, 1978) at the University of California, San Diego. Both groups emphasize the role psychologists can play not only in direct patient care but also as facilitators for communication among staff members. Morris and McFadd discuss the pertinent issues of the unpopularity of working on the burn unit (several house staff gave up their 1-month vacations to trade rotations in order to avoid it), the stresses of working with maimed and disfigured persons, and the ultimate fragmentation and avoidance of patient care. "Staff fight/ flight reactions against the patient's reactions compounded the patient's fight/flight reactions against the staff, and the cycle worsened" (Morris & McFadd, 1978, p. 659). The gradual formation of a mental health team was associated with increased levels of staff communication and decreased hostility:

> Mutual recriminations were often found to overlie common problems and stresses. All involved began to recognize that many of the difficulties . . . were not the result of some weakness or failing in themselves. Rather, many difficulties resulted from the stresses inherent in an extremely taxing job, with very ill and emotionally regressed patients, with few rewards or peer support to offset these strains. (p. 660)

A psychiatrist, a clinical psychologist, a psychiatric social worker, a psychiatry resident, a psychology intern, a medical student, and a social worker served the mental health team for varying numbers of hours per week, with the psychologist being the only full-time team member. The

primary functions were broadly related to (1) consultation, (2) liaison, and (3) teaching. Morris and McFadd noted that the forum of the mental health team was valuable for "support, self-reflection, catharsis, and one another's insight. We elicit our best work from each other" (p. 663). They also pointed to a distinct advantage of the team approach—that is, that it becomes possible for most members to work part-time, offering some protection from the continuous stress inherent in the unit.

Psychologists and other mental health personnel have a demonstrable role in burn care. Certainly, it is one of the most challenging areas within which one could exercise the multiple research and clinical skills derived from the discipline for both mental and physical disabilities. It is highly unlikely, however, that in the near future burn units will see fit to employ adequate numbers of psychological staff to fully meet patient needs. Until such time that the emotional care of patients in critical-care units becomes a priority, the psychological interventions will remain the province of nurses, chaplains, or whoever else has the time and inclination to pursue that end in addition to other duties. The most creative utilization of the psychological or psychiatric component is to work directly with other personnel, sharing relevant information on mental health aspects of both caregiver and patient, and by offering techniques for anxiety and pain reduction that can be employed by the nursing staff.

REFERENCES

Achterberg, J., & Lawlis, G. F. *Imagery of cancer: A diagnostic tool for the process of disease.* Champaign, Ill.: Institute for Personality and Ability Testing, 1978.

Achterberg, J., & Lawlis, G. F. *Bridges of the bodymind.* Champaign, Ill.: Institute for Personality and Ability Testing, 1980.

Adler, A. Neuropsychiatric complications of victims of Boston's Cocoanut Grove disaster. *Journal of the American Medical Association,* 1943, *123,* 1098–1101.

Andreasen, N. J. C. Neuropsychiatric complications in burn patients. *International Journal of Psychiatry in Medicine,* 1974, *5,* 161–171.

Andreasen, N. J. C., & Norris, A. S. Long-term adjustment and adaptation mechanisms in severely burned adults. *The Journal of Nervous and Mental Diseases,* 1972, *154*(5), 352–362.

Andreasen, N. J. C., Norris, A. S., & Hartford, C. E. Incidence of long-term psychiatric complications in severely burned adults. *Annals of Surgery,* 1971, *174,* 785–793.

Andreasen, N. J. C. Noyes, R., & Hartford, C. E. Factors influencing adjustment of burn patients during hospitalization. *Psychosomatic Medicine,* 1972, *34,* 517–525.

Andreasen, N. J. C., Noyes, R., Hartford, C. E., Brodland, G., & Proctor, S. Management of emotional reactions in seriously burned adults. *New England Journal of Medicine,* 1972, *286,* 65–69.

Artz, C. P. The burn patient. *Nursing Forum,* 1965, *4,* 87–92.

Artz, C. P., & Moncrief, J. A. *The treatment of burns* (2nd ed.). Philadelphia: W. B. Saunders, 1969.

Bernstein, M. P. Significant values of hypoanesthesic: Three clinical examples. *American Journal of Clinical Hypnosis,* 1965, *7,* 259–260.

Chang, F. C., & Herzog, B. Burn morbidity: A follow-up study of physical and psychological disability. *Annals of Surgery,* 1976, *183*(1), 34–37.

Cobb, S., & Lindemann, E. Cocoanut Grove burns: Neuropsychiatric observations. *Annals of Surgery*, 1943, *117*, 814–824.

Crasilneck, H. B., Stirman, J. A., Wilson, B. J., McCraine, E. J., & Fogelman, M. J. Use of hypnosis in the management of burns. *Journal of the American Medical Association*, 1955, *158*, 103–106.

Cromes, G. F., Robinson, C., Turrentine, M. *The effects of relaxation training on anxiety and pain during burn wound debridement.* Paper presented at the 40th annual assembly of the American Academy of Physical Medicine and Rehabilitation, New Orleans, November 15, 1978.

Dahinterova, J. Some experiences with hypnosis in the treatment of burns. *International Journal of Clinical and Experimental Hypnosis*, 1967, *15*, 49–53.

Davidson, S. P., & Noyes, R. Psychiatric nursing consultation on a burn unit. *American Journal of Nursing*, 1973, *73*, 1715–1718.

Erickson, E. H. *Identity: Youth and crisis.* New York: W. H. Norton, 1968.

Fagerhaugh, S. Y. Pain expression and control on a burn care unit. *Nursing Outlook*, 1974, *22*, 645–650.

Finer, B. L., & Nylen, B. O. Cardiac arrest in the treatment of burns and report on hypnosis as a substitute for anesthesia. *Plastic and Reconstructive Surgery*, 1961, *27*, 49–55.

Hamburg, D. A. & Adams, J. E. A perspective on coping behavior. *Archives of General Psychiatry*, 1967, *17*, 277–284.

Hamburg, D. A., Artz, C. P., Reiss, E., Amspacher, W. H., & Chambers, R. E. Clinical importance of emotional problems in the care of patients with burns. *New England Journal of Medicine*, 1953, *248*, 355–359.

Hamburg, D. A., Hamburg, B., & deGoza, S. Adaptive problems and mechanisms in severely burned patients. *Psychiatry*, 1953, *16*, 1–20.

Helm, P., Head, M. D., Pullium, G., O'Brien, M., & Cromes, C. F. Burn rehabilitation: A team approach. Symposium on burns. *Surgical Clinics of North America*, 1978, *58*(6), 1263–1277.

Imbus, S. H., & Zawacki, B. J. Autonomy for patients when survival is unprecedented. *New England Journal of Medicine*, 1977, *297*(6), 308–311.

Kjaer, G. C. D. Psychiatric aspects of thermal burns. *Northwest Medicine*, 1969, *68*, 537–541.

Knudsen, Personal Communication, 1980.

Kübler-Ross, E. *On death and dying.* New York: Macmillan, 1969.

Miezala, P. Psychological parameters of burn patient care. In *Practical approach to burn management.* Deerfield, Ill.: Flynt Laboratories, 1977.

Miezala, P. Post burn psychological adaptation: An overview. *Critical Care Quarterly*, 1978, *1*(3), 93–110.

Miller, W. C., Gardner, N., & Mlott, S. R. Psychological support in the treatment of severely burned patients. *Journal of Trauma*, 1976, *16*, 722–725.

Mlott, S. R., Lira, F. T., & Miller, W. C. Psychological assessment of the burn patient. *Journal of Clinical Psychology*, 1977, *33*, 425–430.

Morris, J., & McFadd, A. The mental health team on a burn unit: A multidisciplinary approach. *Journal of Trauma*, 1978, *18*(9), 658–663.

Noyes, R., Jr., Andreasen, N. J. C., & Hartford, C. E. The psychological reaction to severe burns. *Psychosomatics*, 1971, *12*(6), 416–422.

Noyes, R., Jr., Frye, S. J., Slymen, D. J., & Canter, A. Stressful life events and burn injuries. *Journal of Trauma*, 1979, *19*(3), 141–144.

Pennisi, V. R. Deatherage, J., Templeton, J., & Capozzi, A. The psychogenic dependency of the acute burn patient. In P. Matter, T. L. Barclay, & Z. Konickova (Eds.) *Research in burns.* Bern. Hans Huber, 1971.

Quindlen, E. A., & Abram, H. S. Psychosis in the burned patient: A neglected area of research. *Southern Medical Journal*, 1969, *62*, 1463–1466.

Schafer, D. W. Hypnosis use on a burn unit. *The International Journal of Clinical and Experimental Hypnosis*, 1975, *23*(1), 1–14.

Seligman, R. A psychiatric classification system for burned children. *American Journal of Psychiatry*, 1974, *13*(1), 41–46.

Shires, G. T. *Care of the trauma patient*. New York: McGraw-Hill Book Co., 1979.

Simmons, R. D., McFadd, A., Frank, H. A., Green, L. C., Malin, R. M., & Morris, J. L. Behavioral contracting in a burn care facility: A strategy for patient participation. *Journal of Trauma*, 1978, *18*(4), 257–260.

Solnit, A. J., & Priel, B. Psychological reactions to facial and hand burns in young men. *Psychoanalytic Study of the Child*, 1975, *30*, 549–566.

Steiner, H., & Clark, W. R. Psychiatric complications of burned adults: A classification. *Journal of Trauma*, 1977, *17*(2), 134–143.

Sternbach, R. A. *Pain patients: Traits and treatment*. New York: Academic Press, 1974.

Wakeman, R. J., & Kaplan, J. Z. An experimental study of hypnosis in painful burns. American Journal of Clinical Hypnosis, 1978, *21*(1), 3–12.

Weinstein, D. L. Imagery and relaxation with a burn patient. *Behaviour Research and Therapy*, 1976, *14*, 481.

Weisenberg, M. (Ed.). *Pain: Clinical and experimental perspectives*. St. Louis: C. V. Mosby, 1975.

Weisenberg, M. Pain and pain control. *Psychological Bulletin*, 1977, *84*, 1008–1044.

Weisz, A. E. Psychotherapeutic support of burn patients. *Modern Treatment*, 1967, *4*, 1291–1303.

CHAPTER 21

Compliance and Medicine

BRUCE JAMES MASEK

INTRODUCTION: MEDICATION COMPLIANCE AS A MODEL

Patient noncompliance with medical regimens has been the subject of considerable research. Several reviews of the literature have reported estimates of noncompliance ranging from 4% to 92% (Davis, 1966; Marston, 1970). The magnitude of the problem has prompted the suggestion that poor medical outcomes resulting from noncompliance might account for much of the current general dissatisfaction with the delivery of health care (Korsch & Negrete, 1972). In particular, noncompliance with medication regimens represents an immediate challenge to behavioral scientists because there now exist a number of highly effective drug therapies for various diseases. Patient noncompliance with prescribed medication regimens seriously undermines the effectiveness of drug therapy in both preventive and curative situations and results in unnecessary morbidity, mortality, and cost.

Noncompliance with medical regimens encompasses a variety of topics including medication noncompliance, failure to keep appointments, failure to follow medical recommendations and nonparticipation in health programs. However, this chapter will focus more closely on medication compliance for two reasons. First, medication compliance represents the most carefully researched topic from a behavioral standpoint and best serves to illustrate the potential contribution that

behavioral psychology can make to a serious health problem. Second, drug therapy for acute and chronic illness continues to be the most widely used treatment in medical practice, and the problem of non-compliance is likely to escalate as new drug therapies continue to be developed (Goodman & Gilman, 1980). In a latter section of this chapter, exemplary behavioral research on other medical compliance problems will be reviewed to provide perspective to the topic.

Patient noncompliance with prophylactic medication regimens presents a particularly difficult problem (Sackett & Haynes, 1976) and requires an understanding of the antecedents and consequences of tablet-taking behavior. Convincing pregnant women or anemic individuals to take iron supplements, atherosclerotic patients to take cholestyramine, epileptics to take anticonvulsants, alcoholics to take Antabuse, antihypertensives to take diuretics, or psychiatric patients to take psychopharmacologic drugs, to name a few, has proven to be a difficult task (Blackwell, 1972; Marston, 1970; Melchoir, 1965; Porter, 1969). Prophylactically prescribed medication has a lower probability of being taken by a person than medication prescribed for symptomatic relief. There are no short-term reinforcing consequences associated with the intake of prophylactically prescribed medication. Noncompliance with antihypertensive medications is common (Sackett & Haynes, 1976) and serves to illustrate the complexity of the problem. Regular ingestion of antihypertensive medication does not afford the person any immediate symptomatic relief because the disease process is typically insidious. Discriminable symptoms are usually absent. The negative consequences of noncompliance, although quite serious, are delayed in time and probably control very little present-day behavior. On the other hand, the patient prescribed an analgesic for pain is more likely to adhere to the medication regimen to avoid pain. The symptomatic relief afforded by the medication serves to negatively reinforce medication-taking behavior.

Noncompliance with oral medication regimens has important implications for medical research as well. A major means of assessing the efficacy and safety of a drug is by conducting a controlled clinical trial. The interpretation of results of clinical trials can be seriously distorted if noncompliance is not identified. Several researchers have pointed out the need to demonstrate medication compliance in subjects participating in controlled evaluations of drug therapy (Blackwell, 1972; Joyce, 1962; Lasky, 1962; Rickels, Boren, & Stuart, 1964). Rickels *et al.* (1964) analyzed the results of a controlled clinical trial of the efficacy of two minor tranquilizers with and without the inclusion of data from non-compliant subjects. They found that inclusion of the data from the non-compliant subjects increased the drug–placebo contrast enough to alter the interpretation of the drug's effectiveness. Recently, Soutter and Kennedy (1974) reviewed 768 studies published in the *British Medical Journal* and the *Lancet* between January 1969 and December 1972 in which drug effects were studied. Of the studies surveyed, 324 (42%) required an assessment of compliance to insure that the drug(s) were being taken

according to the prescribed medical protocol. Of those studies, only 61 (19%) employed an objective assessment of compliance. The authors concluded that many published trials should be replicated to obtain more valid results by including an objective assessment of compliance.

At present, the number of studies employing principles and procedures of applied behavior analysis in establishing compliance to medication regimens is small. Collectively, however, this research has yielded highly promising results and bears detailed description due to the methodological and clinically significant advances they represent. Before proceeding with a review of this research, a general discussion of methodological issues in compliance research and previous relevent research will place the problem of medication noncompliance in historical perspective.

MEASUREMENT OF MEDICATION COMPLIANCE

The definition and measurement of compliance are central to the empirical analysis of procedures to establish compliance. The definition of compliance has varied greatly among researchers, and agreement on a uniform definition remains one of the major methodological issues in compliance research (Goldsmith, 1976). The reason for this, in part, is the measurement techniques that have been used to assess compliance: therapeutic outcome, patient self-report, tablet or bottle counts, and urine or serum tracers and bioassay. There are limitations to all of these procedures as they have been used in the past, and continued research into assessment methodologies is needed.

Therapeutic Outcome

Therapeutic outcome, though typically not acknowledged as such, is the standard clinical assessment of compliance. The assumption is that if the desired therapeutic effect is achieved, then the patient was compliant. Therapeutic outcome is rarely used as the sole measure of compliance in controlled research. The relationship between the degree of compliance necessary for the desired therapeutic outcome is not completely understood and varies with different drugs and diseases (Gordis, 1979). For this reason, outcome is considered to be an indirect measure of compliance of extremely limited usefulness. However, information on the relationship between compliance levels and clinical outcome is vital and should be routinely reported.

Patient Self-Report

Another indirect method for assessing patient compliance is patient self-report. Park and Lipman (1964) conducted a comparison of patient self-report of compliance versus tablet counts of unused medication. Ex-

amination of 117 bottles returned by 36 patients revealed that 51% contained more tablets than they would have if the patients had taken two tablets three times a day, as prescribed. Patient self-report of compliance revealed that only 15% of the patients admitted to a dosage deviation. Bergsman and Werner (1963) found that although 83% of a sample of parents claimed that their children were taking penicillin as prescribed, only 8% of the urine samples contained any antibiotic. Rickels and Briscoe (1967) found that self-report and tablet count measures of compliance were discrepant by 60%. Of 225 patients reporting 100% compliance, 161 (72%) were found to be noncompliant as determined by the tablet count method; 63 patients reported that they had deviated only slightly from the prescribed regimen, yet tablet counts revealed that 13 patients (20%) deviated from the prescribed regimen "markedly." Gordis, Markowitz, and Lilienfield (1969), studying compliance with penicillin prophylaxis for rheumatic fever recurrences, found considerable discrepancy between the patients' and their mothers' report of compliance and urine bioassays for penicillin. The urine tests showed that only 33–42% of the patients were compliant, but compliance estimates given by the patients or their mothers ranged from 69% to 72%. When compared with the results of more objective measures of compliance, there exists little experimental evidence to indicate that patient self-report is a reliable measure of compliance.

Tablet or Bottle Counts

Several investigators have used tablet or bottle counts to assess compliance. Patients are given an oversupply of their medication and asked to return the unused portion at periodic intervals. What is left is taken to be a measure of the degree of compliance. For example, Roth and Berger (1960) found that peptic ulcer patients consumed on the average only 40–45% of an antacid prescribed, based on the amount of antacid remaining in bottles left at bedside and checked daily. Caron and Roth (1968), in a follow-up study, found that patient compliance to an antacid regimen was only 45% but that, more significantly, the 27 attending physicians were unable to predict their patients' compliance at anything but the chance level. The median physician error of estimate of compliance was 32%. Of 27 physicians, 22 overestimated their patients' compliance rates. Lipman, Rickels, Unlenhuth, Park, and Fisher (1965) reported that 39% of a sample of 135 outpatients deviated from the prescribed regimen of six meprobamate tablets per day. Of the 129 patients prescribed placebos, 49% were noncompliant. Patients were given an oversupply of tablets in three bottles and were required to return the unused portions at four weekly intervals. Compliance was designated as 100% adherence to the prescribed dosage, which represents a stringent criterion that very few researchers are willing to adopt when measuring compliance.

The tablet or bottle count technique rests on the assumption that

what is not returned has been faithfully taken by the patient. Recent evidence suggests that this is not necessarily a valid assumption. Roth, Caron, and Hsi (1970) compared a bottle count procedure and a serum tracer technique for measuring compliance of 105 peptic ulcer patients to an antacid regimen. During the first 12 months of treatment, the correlation between bottle counts and the serum tracer (sodium bromide) was only 0.51. The bottle count tended to overestimate the intake of medication by 20% as compared to the tracer technique. Bottle counts were made monthly in the patients' homes and serum bromide levels were measured during each of nine clinic visits required of each patient during the year. Compliance was defined as 100% adherence to the prescribed dosage when using the bottle count method. A range of expected levels of bromide per 100 ml of serum was calculated from subjects who actually took the full dose of antacid with the added bromide when using serum bromide level as a measure of compliance. Patients whose serum bromide levels fell outside this range were determined to be noncompliant.

Urine or Serum Tracers and Tests

These are the most accurate methods available at present (Blackwell, 1972) for determing medication compliance. Two methods are in common use. One method makes use of chemical tracers that are incorporated into the medication, are not discriminable by the patient, and are readily detected in the serum or urine. Phenol red (Ryan, Carver, & Haller, 1962), riboflavin (Porter, 1969), sodium bromide (Roth *et al.*, 1970), and atropine (Roth, Caron, & Hsi, 1971) have been used with some success.

The serum or urine tracer technique is not without limitations. The main problem is that simply testing for the presence of a tracer does not provide information about the degree to which a patient is compliant. It is possible to manipulate the level of the tracer in the urine or serum, and a patient could take a tablet just prior to testing and none for some time previously. More seriously, the ideal marker has not yet been developed, but it should be one that is completely absorbed, has a relatively long plasma half-life, is not metabolized, is pharmacologically inert, and is totally excreted (Roth *et al.*, 1970).

The second method involves bioassay of the medication or its metabolites, usually in the patient's serum or urine. Using a urine chromatography procedure, Willcox, Gillan, and Hare (1965) were able to estimate outpatient noncompliance with chlorpromazine and/or imipramine therapy at 48%. Luntz and Austin (1960), using reagent strips sensitive to paramino salicylic (PAS), were able to determine that of 705 tuberculosis patients studied for a period of 2 months, 34% were noncompliant with the PAS therapy. Other studies based on PAS urine examinations indicated noncompliance rates of 28% (Preston & Miller, 1964) and 49% (Wynn-Williams & Avis, 1958). Bonnar, Goldberg, and Smith

(1969) reported that in a group of 60 pregnant women, 25% to 32% did not comply with an iron supplement regimen based on hemoglobin levels in the stool. Irwin, Weitzell, and Morgan (1971), using urine bioassay for phenothiazines, found that, of 126 patients, 93% were compliant on a closed ward, 68% were compliant on an open ward, and 37% were compliant subsequent to discharge.

Ryan *et al.* (1962) have pointed out several deficiencies in bioassay methods. Although more precise than other methods, quality control is a major consideration as false positives and false negatives can result from unreliable laboratory procedures (Brett, 1977; Richens, 1975). Not every drug can be readily detected in the serum or urine, some drugs can be assayed only at considerable expense, and it is routinely difficult to specify optimum serum or urine levels (Soutter & Kennedy, 1974). Also, drug levels in the serum or urine can fluctuate considerably due to metabolic factors, the introduction of other drugs, or sudden changes in diet or weight. For many drugs with short metabolic half-lives, patient manipulation of serum or urine levels is possible, again raising questions about the reliability of the compliance estimate. Finally, this method does not allow for a fine-grain analysis of tablet-taking responses, which can be important in clinical trials of drug efficacy.

Summary

This brief review of the various techniques used to measure compliance illustrates one of the difficulties facing compliance researchers: accurately assessing medication ingestion. Choosing an assessment technique will be based on the level of analysis and degree of objectivity needed to evaluate the specified treatment to improve compliance. Opting for the objectivity of urine or serum analysis will require a knowledge of the absorption, distribution, and metabolic fate of the medication in question along with the reliability of the bioassay procedure to design a meaningful experiment and accurately interpret the results in terms of compliance behavior. Future compliance research will likely depend on bioassay procedures for assessment to a large extent. However, some interesting alternatives based, in part, on behavioral assessment technology have been developed and will be discussed in a subsequent section of this chapter. The possibility of a multiple-assessment strategy, using both a bioassay technique and a behavioral assessment procedure, presents obvious advantages in interpreting the results of a study.

DETERMINANTS OF MEDICATION COMPLIANCE

There is widespread agreement that noncompliance with medication regimens is a serious problem, but attempts to summarize the compliance literature have been difficult and have yielded broad estimates of

the extent of patient noncompliance with few generalizations. Certainly, very few effective treatment strategies were developed prior to the behaviorists' entry into the area. The vast majority of compliance research has been correlational and has studied the relationship between compliance and sociodemographic variables, personality traits, intelligence factors, attitudes about health, physician–patient communication, features of the drug regimen, and physiological effects of the drug (Sackett & Haynes, 1976). Most of this research has been unproductive, but several studies are noteworthy in that an objective assessment of compliance was part of the experimental procedures.

Various features of the therapeutic regimen have been systematically investigated to determine their relationship to compliance behavior. The complexity of the therapeutic regimen appears to be an important variable, and several studies have shown that the more complex the regimen, the less compliant the patients (Clinite & Kabat, 1969; Francis, Korsch, & Morris, 1969; Malahey, 1966; McInnis, 1970; Rickels & Briscoe, 1970). For example, Francis *et al.* (1969), using a chemical bioassay method, found that when three or more medications were prescribed, compliance in pediatric outpatients decreased significantly. Malahey (1966), using a bottle count procedure, found that 36 patients (90%) made some type of medication error (omissions, timing, sequence, or dosage). The more medications a patient was taking the more likely he or she was to deviate from the prescribed regimen. Labeling medications with the name of the drug or teaching the patient about their medications did not significantly decrease the number of medication errors.

Duration of treatment also influences compliance, and several studies have shown that compliance levels decrease over time. Porter (1969) found that compliance to iron tablet regimens in pregnant women was negatively correlated with treatment duration. Using a serum tracer technique, he found that, as treatment progressed through the third trimester of pregnancy, compliance decreased to approximately 67% of a sample of 62 women. Again, dosage also was reported to affect compliance. Patients prescribed a single daily dose were more compliant than patients prescribed a three per day dose. Luntz and Austin (1960) reported that noncompliance with PAS therapy decreased from 82% to 34% in 4 years in their sample of 705 tuberculosis patients. Bergsman and Werner (1963) found that compliance to an oral penicillin regimen decreased from 46% on day 3 of therapy to 8% by day 9, using urine bioassay determinations for penicillin.

Drugs that produce adverse side effects might logically produce noncompliance. In this case the drug serves as an aversive stimulus that punishes the patient contingent on his or her compliance to the medication regimen. However, in studies that employed objective measures of compliance, side effects have not been found to bear an important relationship to compliance (Davis, 1968; Sackett & Haynes, 1976).

Disease variables have also been researched as determinants of com-

pliance. Several studies have demonstrated that there seems to be little relationship between compliance and severity of illness in children with rheumatic fever (Lendrum & Korbin, 1956), ulcer patients (Roth & Berger, 1960), or patients with chronic arthritis (Parker & Bender, 1957). However, Chaves (1960) found that patients with active tuberculosis were more compliant with the antituberculosis drug PAS than were patients with inactive tuberculosis. Gordis *et al.* (1969) found that patients previously hospitalized for acute attacks of rheumatic fever were more compliant to antistreptococcal prophylaxis than those treated at home. In general, compliance has been found to be less among patients with psychiatric diagnoses compared to those with organic ailments (Haynes, 1974). Among patients with psychiatric diagnoses, those diagnosed as schizophrenic (Wilson & Enoch, 1967), given a poor prognosis (Lipman *et al.*, 1965), or diagnosed as having a personality disorder (Willcox *et al.*, 1965) were found to be less compliant with oral medication regimens. All of the studies just mentioned employed objective measures of compliance.

Summary

Sackett and Haynes (1976) reviewed 246 studies dealing with patient noncompliance with therapeutic regimens. Approximately 60% of these studies were concerned with methodological and epidemiological studies and reviews. Of the 193 factors studied in relationship to compliance, only four that were sufficiently researched showed positive correlations with noncompliance. These factors were race, complexity of the therapeutic regimen, duration of treatment, and belief in the efficacy of therapy. Factors such as intelligence, side effects of the medication, and severity of illness were not predictive of compliance. Most of the research in this area has not been useful in that rarely was medication compliance measured objectively. In contrast, Epstein and Masek (1978) found near-zero-order correlations between compliance to a vitamin C regimen and 14 factors including age, sex, alcohol use, number of colds per year, tobacco use, self-rating of health, nonprescription drug use, religious participation, tests of memory, birth order, and Health Locus of Control Scale scores. An analysis of the discriminatory power of these factors in compliant and noncompliant subjects showed that age and self-report of nonprescription drug use were the only factors that significantly discriminated the two groups. This study employed several measures of compliance and will be discussed in detail later in this chapter.

BEHAVIORAL APPROACHES TO MEDICATION COMPLIANCE

Strategies for improving compliance have been less researched and typically have focused on patient education. For example, Sackett,

Haynes, Gibson, Hackett, Taylor, Roberts, and Johnson (1975) presented data indicating that neither mastery of health education information nor easier access to treatment was particularly effective in establishing compliance with an antihypertensive regimen. Subjects were steelworkers who were provided treatment from their regular physicians or were treated in their factory as an augmented convenience. Half of the subjects in each group were also provided an educational package with facts about hypertension, the need for compliance, and simple reminders to influence tablet taking. The results assessed at 6 months showed approximately equivalent effects across all groups, with compliance ranging from 50–56%. These results and the authors' review of the treatment literature suggest that more direct attempts to modify behaviors involved in medication ingestion should be researched.

Behavioral procedures are just beginning to find application in the problem of drug noncompliance. Zifferblatt (1975) argued that noncompliance with medication regimens is essentially a behavioral problem requiring a treatment strategy based on the principles of applied behavior analysis. Behavioral control of medication compliance has employed two basic tactics: (1) manipulation of the antecedents of tablet-taking behavior and (2) manipulation of the consequences of noncompliance.

Stimulus Control

Few empirical studies have solely manipulated stimulus events associated with tablet-taking behavior. Azrin and Powell (1969), in one of the first applications of behavioral engineering to the problem of noncompliance, developed a portable timer–dispenser to establish compliance. The apparatus sounded a tone that was terminated by turning a knob, which then ejected a tablet into the user's hand. The signal was programmed to occur at the times the tablets were to be taken. The authors tested the efficacy of this device in establishing compliance to a placebo regimen requiring ingestion of tablets at half-hour intervals. Subjects were observed by participant observers as a means of assessing compliance, and the results showed that significantly fewer doses were missed by subjects when using the experimental apparatus as opposed to the use of a simple tablet counter. Further investigations employing this apparatus have not been published, probably because less elaborate procedures have been shown to be effective in treating noncompliance. However, this device could have important clinical applications in cases where other procedures have failed to establish compliance and the problem is of sufficient magnitude to warrant the cost. Less elaborate and costly cuing devices such as special packaging (Linkewich, Catalano, & Flack, 1974) and special tablet dispensers and/or reminders (Moulding, 1962) have been proposed but have not been adequately evaluated.

Another technique based on similar stimulus control principles is tailoring the medication regimen to the person's daily routine so that regularly occurring behaviors serve as cues for tablet taking. For example,

Haynes, Sackett, Gibson, Taylor, Hackett, Roberts and Johnson (1976) used tailoring procedures in combination with several other behavioral procedures to effect compliance in a group of Canadian steelworkers with hypertension. Further research on tailoring will be necessary to validate its usefulness in treating noncompliance because this is the only research report to date that has tested its applicability.

Consequence Control

The majority of behavioral research in medication compliance has focused on the manipulation of consequence variables associated with tablet-taking behavior. This line of research has proved to be the most promising.

Providing feedback to subjects has been shown to be an effective procedure in establishing compliance. Gundert-Remy, Remy, and Weber (1976) mailed the results of serum digoxin level determinations to 33 cardiac patients at 8-week intervals on two successive occasions. The mean serum concentration at baseline was 0.5 ng/ml (the lower therapeutic limit is 0.5 ng/ml and half of the subjects were well below this limit). The mean serum concentration following the two mailings were 0.88 ng/ml and 0.89 ng/ml, respectively. These results were statistically significant, and, more importantly, only 3 out of the 33 patients had a serum level less than 0.5 ng/ml at the time of the last serum level determination. Lund, Jorgensen, and Kuhl (1964) conducted a controlled investigation of the effects of feedback on serum diphenylhydantoin (Dilantin) levels. Subjects were 76 epileptic patients who, on discharge from the hospital, were assigned to one of two groups. The experimental group ($n = 36$) was required to return at 2, 6, and 12 weeks after discharge for serum diphenylhydantoin level determinations. If the levels were too low, the subjects were informed of this fact and requested to take their medication as prescribed. The control group ($n = 40$) was required to return 12 weeks after discharge for a serum level determination. The results indicated that, of the 22 subjects in the experimental group that completed the study, 17 showed serum levels within the therapeutic range by the 12th week. Of the 29 subjects who remained in the control group, only 10 showed levels within the therapeutic range. Another study in the use of feedback to increase serum levels of the anticonvulsant ethosuximide (Zarontin) also demonstrated the efficacy of the procedure (Sherwin, Robb, & Lechter, 1973). The only limitation of these two studies was the lack of follow-up to assess whether feedback produced durable changes in compliance behavior.

Two studies on the use of behavioral procedures to maintain regular Antabuse intake successfully used negative consequences to effect compliance. Haynes (1974) implemented a program designed to keep habitual offenders of public intoxication laws in Antabuse treatment. Subjects were given a choice of entering a year of Antabuse therapy or going to jail

for 90 days. Choosing Antabuse therapy meant that the person was required to take his or her Antabuse in the presence of a probation officer twice weekly. After a maximum of two subsequent violations, the person was sent to jail. The results showed that almost half of the chronic offenders were still on Antabuse after 1 year and that the arrest rate for the sample had dropped from 3.8 to 0.3 arrests per year. Bigelow, Strickler, Liebson, and Griffiths (1976) tested a response cost procedure to effect compliance with Antabuse therapy in 20 chronic problem drinkers. A security deposit averaging $71.25 was required of each participant. Failure to report to the clinic for a scheduled dose of Antabuse resulted in forfeiture of between $5 and $10 per visit. Patients were required to come daily for the first 2 weeks and then every other day. The results showed that the patients were abstinent for 95% of the treatment days in the initial contract (at least 3 months). Only 7.8% of the scheduled clinic visits were missed by the patients. A total of 70% of the patients reenlisted in a second contract, and 76.9% of those patients were successfully abstinent throughout their second contract.

Compliance with antihypertensive medications has been studied fairly extensively by Sackett, Haynes, and their colleagues. As previously mentioned, in one study (Sackett et al., 1975) a combination of augmented convenience for hypertensive care and mastering the learning of facts about hypertension was largely unsuccessful in improving compliance in 230 Canadian steelworkers. This unsuccessful outcome prompted a second study (Haynes et al., 1976) in which 38 of the subjects were exposed to a behavioral program to improve compliance. Treatment consisted of self-monitoring of blood pressure and medication ingestion. In addition, suggestions were made as to how to tie the tablet-taking response to daily rituals performed by the subjects. Every 2 weeks the subjects' pressures were checked and criterion performance (diastolic: < 90 mmHg) resulted in a $4 credit toward the purchase of the blood pressure–recording equipment. Urine specimens were collected randomly without warning at home and at the subject's place of employment. Unobtrusive tablet counts of unused medication as a further assessment of compliance were also made. The results indicated that compliance was 80% in the experimental group ($n = 20$) and 39% in the control group ($n = 18$) after 6 months. An average decrease in diastolic blood pressure of 5.4 mmHg was observed in the experimental group, as compared to a 1.9 mmHg drop in the control group. Though the decrease in blood pressure is not impressive, the results suggest that behavioral procedures can be used effectively to modify maladaptive health behavior that can eventually promote changes in the basic pathophysiology of hypertension.

Epstein and Masek (1978) compared several behavioral procedures designed to manipulate both stimulus and consequence variables in the modification of vitamin C intake in college students. Subjects were informed that they were participating in a study of the effects of vitamin C

in preventing the common cold. In this way, vitamin C served as an analogue to medicine typically prescribed prophylactically or for asymptomatic disorders. A 3-week baseline indicated that 79% of 71 subjects were noncompliant with the four-tablet/day regimen. The 40 most noncompliant subjects were randomly assigned to one of four groups: a no-treatment control group; a self-monitoring group whose subjects recorded the time of tablet ingestion; a taste group in which subjects were given tablets flavored neutral, orange, or quinine to increase their saliency as cues, a strategy suggested by Zifferblatt (1975); and a self-monitoring plus taste group in which subjects recorded the flavor of the tablet they were ingesting. Results after 3 weeks indicated that the two self-monitoring groups were significantly better than the other groups in improving compliance. During the final 3 weeks of the study, half of the subjects in each group were exposed to a response cost procedure. One dollar of a $9 deposit made by the subjects at the beginning of the experiment was forfeited if weekly compliance did not reach a criterion level. Results of this phase showed significant improvements in all response cost groups, independent of prior history. The self-monitoring plus taste subjects also showed compliance levels equal to the response cost subjects, whereas self-monitoring alone proved to be a less durable treatment.

This study also tested a novel assessment procedure for compliance. In addition to counts of unused tablets returned by the subjects each week, a variation on a urine tracer method was employed. Within each week's supply were tablets containing phenazopyridine in a programmed sequence. phenazopyridine, as a urinary tract analgesic, colors the urine a bright reddish orange. Subjects were required to record the occasions they noticed urine discolorations, and compliance was measured by comparing these times to the intervals programmed for urine discolorations. The procedure was useful, correlated well with tablet counts, and might be even more accurate in assessing compliance in less complex regimens.

Noncompliance with anticonvulsant medication regimens is another common clinical problem (Penry, 1978). This is unfortunate because it has been estimated that nearly 80% of all epileptic patients could become seizure free with the currently available anticonvulsant drugs (Pippenger, Penry, & Kutt, 1978). Recent data by Masek, Cataldo, Freeman, and Roulston (in press) suggest that behavioral procedures are highly applicable to this problem. The effects of telephone prompts and a positive consequence on appointment keeping and compliance to anticonvulsant medications were studied in a population of nine chronically noncompliant epileptic patients. Serum anticonvulsant levels were determined weekly for 6 weeks, and subjects received Maryland State Lottery tickets for keeping their appointments and for demonstrating compliance by having levels within established therapeutic ranges. They also received telephone prompts 2 days prior to their clinic visits reminding them of their appointments. The results indicated that subjects kept an

average of 77% of their clinic appointments prior to treatment and 30% kept every scheduled appointment. After implementation of the prompt and lottery incentive, appointment keeping was virtually unaffected (78% of the appointments were kept), but 60% of the subjects kept every appointment. Data on medication compliance indicated that therapeutic levels were achieved in 10% of the determinations for Dilantin, 29% for Tegretol, and 62% for phenobarbital prior to treatment. Following implementation of treatment, therapeutic levels increased to 50% of the determinations for Dilantin, 80% for Tegretol, and 100% for phenobarbital. These data suggest that compliance with medication regimens can be manipulated by providing access to positive consequences occurring naturally in the environment. This can have important cost-effectiveness implications. The results of this study also suggest that maintenance of compliance, once it has been established, is an important research issue. Preliminary 3-month follow-up results indicated that medication compliance was, for all three drugs, lower than pretreatment levels following removal of the telephone prompts and lottery incentive after 6 weeks.

Summary and Implications for Future Research

Studies of medication compliance suggest that behavioral procedures are effective and warrant further investigation. In particular, response cost procedures can be highly useful with chronic noncompliers. Stimulus control procedures can be useful with less serious compliance problems or with medications allowing wide latitude in dosage deviations before therapeutic serum levels begin to fall. The assessment methodology of Epstein and Masek (1978) appears useful and should be applied to clinical populations on a smaller scale to determine the limitations of the technique. Continued research on a larger scale is also necessary and should be conducted concurrent with controlled clinical trials of drug effects whenever possible. In investigating future treatment strategies, attention should be given to developing an easily implemented, cost-effective package that is utilizable within the context of current medical practice—for example, developing an intervention package for noncompliance that could be economically employed in any ongoing seizure clinic, blood pressure clinic, or well-baby clinic by the medical staff.

OTHER PROBLEMS IN COMPLIANCE

The idea of patient compliance is central to several aspects of health care. Compliance research suggests that noncompliance with medical advice, procedures, and routine medical care opportunities are as pervasive as noncompliance with medication regimens (Sackett & Snow, 1979). The application of behavioral methodology to solve compliance

problems throughout the health care system might be one of the most important roles for behavioral psychology in the next two decades. Currently, health care is the nation's third largest industry, representing 8.6% of the gross national produce in 1977 (Culliton, 1978). This figure is projected to be 33% by the year 2000, which has led to advocacy for more efficient use of existing medical technology and services and intensified research in preventive medicine (Ball, 1978; Walsh, 1978). The field of preventive medicine has already recognized the importance of patient compliance in developing strategies to reduce the impact of proposed risk factors in the etiology of chronic illnesses such as heart, lung, and kidney disease (Masek, Epstein, & Russo, 1981). With this in mind, examples of behavioral research dealing with other compliance problems in health care will be briefly reviewed, hopefully to stimulate reader interest in an emerging field of inquiry.

Improving appointment keeping has long been recognized as a critical factor in improving the health of the population and has been shown to be amenable to modification using behavioral procedures. Several researchers have demonstrated that stimulus control procedures such as mailers and telephone prompts are an effective strategy for reducing "no show" rates (Brigg & Mudd, 1968; Shmarak, 1971; Turner & Vernon, 1976).

Persons with chronic illness frequently are faced with the prospect of a lifetime of fairly close medical monitoring and must engage in routine, complex behaviors to assure continued health. These individuals for a variety of reasons are often noncompliant with the recommended therapeutic procedures. Several well-controlled studies have recently been published that demonstrate the potential of behavioral interventions to help manage serious illness. Barnes (1976) reported that a token economy was successful in maintainting appropriate dietary restrictions in a hemodialysis patient prone to fluid overload. Tokens were awarded for minimal daily weight gains and exchanged for water up to a maximum of 800 cc/day. The results showed a decrease in weight gain and blood pressure with maintenance of therapeutic effects at 6 months. Magrab and Papadopoulou (1977) reported the successful application of a similar program in the modification of dietary behavior in seven children on hemodialysis. Lowe and Lutzker (1979) successfully increased compliance to 100% in the performance of behaviors targeted as important for the continued health of a 9-year-old diabetic. First a memo and then a point system were implemented in multiple-baseline fashion across three behaviors: foot care, urine testing, and appropriate diet. Follow-up evaluations at 3, 8, and 10 weeks showed a maintenance of treatment effects. Dapcich-Miura and Hovell (1979) used a token system to increase physical activity, orange juice consumption, and medication compliance in an 82-year-old myocardial infarction (MI) patient. A multiple-baseline design across behaviors with a reversal clearly demonstrated the effectiveness of the treatment procedures. Finally, Baile and Engel (1978)

showed that self-monitoring, verbal reinforcement, and self-planning of
the treatment program were effective in establishing compliance to med-
ical recommendations in seven MI patients.

It is evident, even from this cursory review, that behavioral proce-
dures can result in significant modifications in an individual's behavior
that improve his or her health status. More single-case empirical studies
are clearly needed to provide examples of the types of problems and popu-
lations that can be treated with behavioral methodology and to educate
the medical community as to their applicability.

PRACTICAL ISSUES

As evidenced by the preceding survey of the compliance literature,
the types of compliance problems that are likely to be encountered in
health care settings are quite varied. Solving medical-compliance prob-
lems usually requires performing a functional analysis of the antecedents
and consequences of the noncompliant behavior. From such an analysis,
treatment procedures can be evaluated and modified as dictated by the
data. This, of course, is more readily accomplished when dealing with
inpatients. The description of a case study will help to illustrate this
process as it occurs in a hospital setting.

The case involved a 5-year-old female, Beverly, who was admitted
with undiagnosed leukemia. Following several months of hospitalization,
she began to refuse her medications, submitting to physical exam-
inations, and food. She also intermittently would attempt to dislodge her
IV preparation. She became abusive with hospital staff and was generally
avoided unless a medical procedure was to be performed. Following sev-
eral observation sessions, it became apparent that Beverly's non-
compliance was a function of several factors. First, she was attended to by
her mother around the clock, and her mother virtually had assumed the
role of primary nurse. Second, the cytotoxic drugs she was taking made
her chronically nauseous, weak, and caused her hair to fall out. Third,
from the beginning of her hospital stay, she was in isolation due to low-
ered immunity, and visitors had to wear gowns, head caps, and masks
when visiting her. Several reinforcers were evaluated, with mother's at-
tention being the most potent. Since there was a strong possibility that
Beverly would die, we were reluctant to make mother's attention contin-
gent on taking her medication regularly, letting her doctor examine her
and draw blood, and consuming an adequate amount of calories per day.
However, a point system and attempts to establish hospital staff as social
reinforcers failed. After explaining our analysis to Beverly's mother, she
agreed to withdraw her attention for brief intervals when Beverly failed to
meet the behavioral criteria established. The implementation of this pro-
gram initially resulted in severe tantrums from Beverly. But with con-
tinued support and guidance, Beverly's mother was able to follow through

and a significant increase in compliance with the three behaviors resulted. Also, attempts to "normalize" Beverly's hospital environment were implemented by allowing her to visit child life under special circumstances, by allowing visitors to enter her room without scrubbing and dressing as long as they remained a certain distance from her, and by providing special treats not previously on her menu that she had enjoyed at home. Beverly was finally discharged after 4 months with her leukemia in remission.

Often, particularly in dealing with compliance problems with outpatients, the functional analysis will be incomplete because direct observation of the behavioral parameters is not feasible and gaining control of the necessary reinforcing events is difficult. Simply educating the patient as to the importance of being compliant can improve the situation, but usually, by the time a behavioral psychologist has been called in to consult, the problem is chronic. In the case of children, the problem typically can be traced to the parents. Children with chronic illness frequently learn maladaptive responses that tend to be maintained by their parents. If these responses interfere with optimal medical management of their diseases, then parent training in the use of contingency management procedures is indicated. In the case of chronic adult noncompliers, behavioral contracts, stimulus control procedures such as prompts or tailoring, and family involvement should be evaluated.

Costly, elaborate procedures requiring specialized training should be attempted only as a last resort to solve medical compliance problems. Physicians, in particular, are more receptive to straightforward, easily implemented procedures that can be incorporated into the routine medical management of the patient. Maintenance of treatment effects, as in many behavior problems, is a critical issue in medical compliance that should be evaluated continuously in clinical settings. Procedures to assure maintenance of compliance once established have, for the most part, received little research attention. Medical acceptance of behavioral procedures as adjunctive treatments will require the demonstration of durable treatment effects.

REFERENCES

Azrin, N. H., & Powell, J. Behavioral engineering: The use of response priming to improve prescribed self-medication. *Journal of Applied Behavior Analysis*, 1969, 2, 39–42.

Baile, W. F., & Engel, B. T. A behavioral strategy for promoting treatment compliance following myocardial infarction. *Psychosomatic Medicine*, 1978, 40, 413–419.

Ball, R. M. National health insurance: Comments on selected issues. *Science*, 1978, 200, 864–870.

Barnes, M. R. Token economy control of fluid overload in a patient receiving hemodialysis. *Journal of Behavior Therapy and Experimental Psychiatry*, 1976, 7, 305–306.

Bergsman, A. B., & Werner, R. J. Failure of children to receive penicillin by mouth. *New England Journal of Medicine*, 1963, 268, 1334–1338.

Bigelow, G., Strickler, D., Liebson, I., & Griffiths, R. Maintaining disulfiram ingestion

among outpatient alcoholics: A security-deposit contingency contracting procedure. *Behavior Research and Therapy,* 1976, *14,* 378–381.

Blackwell, B. The drug defaulter. *Clinical Pharmacology and Therapeutics,* 1972, *13,* 841–848.

Bonnar, J., Goldberg, A., & Smith, J. A. Do pregnant women take their iron? *Lancet,* 1969, *1,* 457–458.

Brett, E. Implications of measuring anticonvulsant blood levels in epilepsy. *Developmental Medicine and Child Neurology,* 1977, *19,* 245–251.

Brigg, E. H., & Mudd, E. H. An exploration of methods to reduce broken first appointments. *Family Coordination,* 1968, *17,* 41–46.

Caron, H. S., & Roth, H. P. Patients' cooperation with a medical regimen. *Journal of the American Medical Association,* 1968, *203,* 120–124.

Chaves, A. Results of the P.A.S. urine test. *American Review of Respiratory Diseases,* 1960, *81,* 111–119. ˙

Clinite, J., & Kabat, H. Improving patient compliance. *Journal of the American Pharmacy Association,* 1976, *16,* 74–76.

Culliton, B. J. Health care economics: The high cost of getting well. *Science,* 1978, *200,* 883–885.

Dapcich-Miura, E., & Hovell, M. F. Contingency management of adherence to a complex medical regimen in an elderly heart patient. *Journal of Applied Behavior Analysis,* 1979, *10,* 193–201.

Davis, M. S. Variations in patient's compliance with doctor's orders: Analysis of congruence between survey responses and results of empirical investigations. *Journal of Medical Education,* 1966, *41,* 1037–1048.

Davis, M. S. Physiologic, psychological and demographic factors in patient compliance with doctor's orders. *Medical Care,* 1968, *6,* 115–122.

Epstein, L. H., & Masek, B. J. Behavioral control of medicine compliance. *Journal of Applied Behavior Analysis,* 1978, *11,* 1–9.

Francis, V., Korsch, B. M., & Morris, M. J. Gaps in doctor-patient communication. *New England Journal of Medicine,* 1969, *280,* 535–540.

Goldsmith, C. H. The effect of differing compliance distributions on the planning and statistical analysis of therapeutic trials. In D. L. Sackett & R. B. Haynes (Eds.), *Compliance with therapeutic regimens.* Baltimore: Johns Hopkins University Press, 1976.

Goodman, L. S., & Gilman, A. *The pharmacological basis of therapeutics.* New York: Macmillan, 1980.

Gordis, L. Conceptual and methodological problems in measuring patient compliance. In R. B. Hayes, D. W. Taylor, & D. L. Sackett (Eds.), *Compliance in health care.* Baltimore: Johns Hopkins University Press, 1979.

Gordis, L., Markowitz, M., & Lilienfield, A. M. The inaccuracy in using interviews to estimate patient reliability in taking medications at home. *Medical Care,* 1969, *7,* 49–54.

Gundert-Remy, U., Remy, C., & Weber, E. Serum digoxin levels in patients of a general practice in Germany. *European Journal of Clinical Pharmacy,* 1976, *10,* 97–100.

Haynes, R. B., Sackett, D. L., Gibson, E. S., Taylor, D. W., Hackett, B. C., Roberts, R. S., & Johnson, A. L. Improvement of medication compliance in uncontrolled hypertension. *Lancet,* 1976, *1,* 1265–1268.

Haynes, S. N. Contingency management in a municipally administered antabuse program for alcoholics. *Journal of Behavior Therapy and Experimental Psychiatry,* 1974, *4,* 31–32.

Irwin, D. S., Weitzell, W. D., & Morgan, D. W. Phenothiazine intake and staff attitudes. *American Journal of Psychiatry,* 1971, *127,* 1631–1635.

Joyce, C. R. B. Patient cooperation and the sensitivity of clinical trials. *Journal of Chronic Diseases,* 1962, *15,* 1025–1036.

Korsch, B. M., & Negrete, V. F. Doctor-patient communication. *Scientific American,* August 1972, 66–74.

Lasky, J. L. The problem of sample attrition in controlled treatment trials. *Journal of Nervous and Mental Diseases*, 1962, *135*, 332–337.

Lendrum, B., & Korbin, C. Prevention of recurrent attacks of rheumatic fever: Problems revealed by long-term follow-up. *Journal of the American Medical Association*, 1956, *162*, 13–16.

Linkewich, J. A., Catalano, R. B., & Flack, H. L. The effect of packaging and instruction in out-patient compliance with medication regimens. *Drug Intelligence in Clinical Pharmacy*, 1974, *8*, 10–15.

Lipman, R. S., Rickels, K., Uhlenhuth, E. H., Park, L. C., & Fisher, S. Neurotics who fail to take their drugs. *British Journal of Psychiatry*, 1965, *111*, 1043–1049.

Lowe, D., & Lutker, J. F. Increasing compliance in a medical regimen with a juvenile diabetic. *Behavior Therapy*, 1979, *10*, 57–64.

Lund, M., Jorgensen, R. S., & Kuhl, V. Serum diphenylhydantoin (Dilantin) in ambulant patients with epilepsy. *Epilepsy*, 1964, *5*, 51–58.

Luntz, R. W. A., & Austin, R. New stick test for P.A.S. in urine. *British Medical Journal*, 1960, *1*, 1679–1682.

Magrab, P. R., & Papadopoulou, Z. L. The effect of a token economy on dietary compliance for children on hemodialysis. *Journal of Applied Behavior Analysis*, 1977, *10*, 573–578.

Malahey, B. The effects of instructions and labeling on the number of medication errors made by patients at home. *American Journal of Hospital Pharmacy*, 1966, *23*, 283–292.

Marston, M. V. Compliance with medical regimens: A review of the literature. *Nursing Research*, 1970, *19*, 312–323.

Masek, B. J., Cataldo, M. F., Freeman, J., & Roulston, D. Behavioral control of compliance with anticonvulsant drug regimens. *Behavior Therapist*, in press.

Masek, B. J., Epstein, L. H., & Russo, D. C. Behavioral perspectives in preventive medicine. In S. Turner, K. Calhoun, & H. Adams (Eds.), *Handbook of clinical behavior therapy*. New York: Wiley, 1981.

McInnis, J. K. Do patients take antituberculosis drugs? *American Journal of Nursing*, 1970, *70*, 2152–2153.

Melchoir, J. C. The clinical use of serum determinants of phenytoin and phenobarbital in children. *Developmental Medicine and Child Neurology*, 1965, *7*, 387–391.

Moulding, T. Proposal for a time-recording pill dispenser as a method for studying and supervising the self-administration of drugs. *American Review of Respiratory Diseases*, 1962, *85*, 754–757.

Park, L. C., & Lipman, R. S. A comparison of patient dosage deviation reports with pill counts. *Psychopharmacologia*, 1964, *6*, 299–302.

Parker, L. C., & Bender, L. F. Problems of home treatment in arthritics. *Archives of Physical Medicine*, 1957, *38*, 392–394.

Penry, J. K. Reliability of serum antiepileptic drug concentrations and patient management. In C. E. Pippenger, J. K. Penry, & H. Kutt (Eds.), *Antiepileptic drugs: Quantitative analysis and interpretation*. New York: Raven Press, 1978.

Pippenger, C. E., Penry, J. K., & Kutt, H. (Eds.). *Antiepileptic drugs: Quantitative analysis and interpretation*. New York: Raven Press, 1978.

Porter, A. M. W. Drug defaulting in general practice. *British Medical Journal*, 1969, *1*, 218–222.

Preston, D. F., & Miller, F. L. The tuberculosis outpatients' defection from therapy. *American Journal of Medical Science*, 1964, *247*, 21–25.

Richens, A. Quality control of drug estimations. *Acta Neurologica Scandinavica*, 1975, *60*, 81–84.

Rickels, K., & Briscoe, E. Assessment of dosage deviation in outpatient drug research. *Journal of Clinical Pharmacology*, 1970, *10*, 153–160.

Rickels, K., Boren, R., & Stuart, H. M. Controlled psychopharmacological research in general practice. *Journal of New Drugs*, 1964, *4*, 138–147.

Roth, H. P., & Berger, D. G. Studies on patient cooperation in ulcer treatment. I. Observa-

tion of actual as compared to prescribed antacid intake on a hospital ward. *Gastroenterology*, 1960, *38*, 630–633.

Roth, H. P., Caron, H. S., & Hsi, B. P. Measuring intake of prescribed medication: A bottle count and a tracer technique compared. *Clinical Pharmacology and Therapeutics*, 1970, *11*, 228–237.

Roth, H. P., Caron, H. S., & Hsi, B. P. Estimating a patient's cooperation with his regimen. *American Journal of Medical Science*, 1971, *262*, 269.

Ryan, W. L., Carver, M. J., & Haller, J. Phenolsulfonthalein as an index of drug ingestion. *American Journal of Pharmacy*, 1962, *134*, 168–171.

Sackett, D. L., & Haynes, R. B. *Compliance with therapeutic regimens.* Baltimore: Johns Hopkins University Press, 1976.

Sackett, D. L., & Snow, J. C. The magnitude of compliance and noncompliance. In R. B. Hayes, D. W. Taylor, & D. L. Sackett (Eds.), *Compliance in health care.* Baltimore: Johns Hopkins University Press, 1979.

Sackett, D. L., Haynes, R. B., Gibson, E. S., Hackett, B. C., Taylor, D. W., Roberts, R. S., & Johnson, A. L. Randomized clinical trial of strategies for improving medication compliance in primary hypertension. *Lancet*, 1975, *1*, 7918–7920.

Sherwin, A. L., Robb, J. P., & Lechter, M. Improved control of epilepsy by monitoring plasma ethosuximide. *Archives of Neurology*, 1973, *28*, 178–181.

Shmarak, K. L. Reduce your broken appointment rate: How one children and youth project reduced its broken appointment rate. *American Journal of Public Health*, 971, *61*, 2400–2404.

Soutter, R. B., & Kennedy, M. C. Patient compliance assessment in drug trials: Usage and methods. *Austrailian and New Zealand Journal of Medicine*, 1974, *4*, 360–364.

Turner, A. J., & Vernon, J. C. Prompts to increase attendance in a community mental health center. *Journal of Applied Behavior Analysis*, 1976, *9*, 141–145.

Walsh, J. Federal spending passes the $50-billion mark. *Science* 1978, *200*, 886–887.

Willcox, D. R. C., Gillan, R., & Hare, E. H. Do psychiatric patients take their drugs? *British Journal of Medicine*, 1965, *2*, 790–792.

Wilson, J. D., & Enoch, M. D. Estimation of drug rejection by schizophrenic in-patients, with analysis of clinical factors. *British Journal of Psychiatry*, 1967, *113*, 209–211.

Wynn-Williams, N., & Avis, M. On omitting P.A.S. *Tubercule*, 1958, *39*, 138–142.

Zifferblatt, S. M. Increasing patient compliance through the applied analysis of behavior. *Preventive Medicine*, 1975, *4*, 173–182.

Geriatric Patients

D. ALAN LANKFORD AND STEVEN H. HERMAN

INTRODUCTION

In recent years, the fields of psychology and medicine have witnessed refinements and improvements in existing approaches to human problems, as well as the emergence of new techniques for treatment of special problems or populations. One consequence of these improvements in patient care has been an increase in the proportion of elderly citizens throughout the population. By one recent estimate, persons over the age of 65 number 22 million, or approximately 10% of the population (Reichel, 1978). Projected population figures indicate that by the year 2000, these numbers will have increased to 30 million, or approximately 12% of the population, with both figures continuing to increase into the next century. These persons represent a special population with unique needs and problems that include both psychological and physical components.

The emergence of the field of behavioral medicine, stressing an integration of the behavioral and biomedical sciences (Schwartz & Weiss, 1978), has served to emphasize the need for the development and refinement of techniques specifically to remedy the problems of older individuals. For example, the elderly have more chronic disease and utilize more health services than any other single age group (Levine, 1975). Though only 40% of persons under 65 have a chronic disease, 74% of those over age 65 have a chronic disease (Paton, 1978). This trend has been further

D. ALAN LANKFORD • Department of Psychiatry and Behavioral Sciences, University of Texas Medical Branch, Galveston, Texas 77550.   STEVEN H. HERMAN • Psychology Service, Veterans Administration Medical Center, and Behavioral Medicine Institute, Miami, Florida 33167.

exacerbated by the increasing accessibility of professional services, resulting in a disproportionate demand for care (Byl & Clever, 1977). In spite of this trend, the current state of affairs in the field of gerontology is one of relative ignorance, as many valid treatment approaches have not been entirely successful when applied to the elderly.

Medical problems, which are clearly more frequent in the elderly, can often have psychological components both in etiology and consequences. Prior to the development of an integrated approach to these problems, the fields of psychology and medicine both tended to focus solely on the respective mental or physical state of the patient, to the exclusion of factors outside their specialty (Gentry, 1978). A team or interdisciplinary approach to the problems of the elderly using both psychological and medical techniques in assessment and intervention would solve this problem and increase the quality of care for geriatric populations. The fields of psychology, medicine, social work, nursing, and other related professions are all important components of a treatment team that would be best equipped to provide total care for the elderly.

Developmental issues are perhaps one of the best examples of the special problems of aging, in the biological as well as the psychological realm. Indeed, gerontology is recognized as a field in which it is essential to study the disease or problems as a developmental process and not merely as an acute event (Butler & Engel, 1978). In the biological realm, progressive degenerative diseases such as arthritis and osteoporosis are good examples of problems not amenable to the standard approaches. Psychological factors and various life stressors such as forced retirement or bereavement can also contribute to the development of problems. And obviously, there is a great deal of overlap in both areas, as stress can contribute to biological problems and vice versa (Butler & Engel, 1978). Many of these problems of the elderly can be peculiar to that population, pointing up the need for the development of new treatment stratagems to treat them.

One example of a new treatment approach was proposed by Ogden Lindsley (1964) who recommended that prosthetic environments for the elderly based on operant principles would be useful both for treatment and assessment. Such an environment could help determine whether a problem is due to organic involvement or to a person–environment interaction, and is thus more amenable to psychological interventions. This and other behavioral approaches provide an alternative to the idea that the problems of the elderly are entirely biologically based and therefore irreversible (Hoyer, Mishara, & Reidel, 1975).

Behavioral approaches also provide a viable alternative in cases where problems are primarily psychiatric in nature. The prevalence of psychiatric disorders among elderly persons living in the community is estimated at 20–45% (Eisdorfer & Cohen, 1978). Although psychotropic drugs are a useful and viable treatment modality, they carry with them a host of other problems when used with geriatric populations. Drug in-

teractions, toxicity, and appropriate dosages are issues that remain unresolved when psychotropic medications are used with older persons (Whelihan, 1978). A more efficacious approach might be to utilize behavioral approaches as an adjunct to pharmacological therapies or vice versa, as the case warrants. As assessment and treatment strategies are refined and further integrated, this combination approach will undoubtedly prove to be more useful than either by itself.

Another area in which the problems of the elderly are unique is the numerous myths surrounding the aging process. These myths might be most prevalent in nursing homes and other such institutions. Disease, senility, and dependence, which result in institutionalization, can be more a function of self-fulfilling prophesies than of natural processes, and nursing homes can perpetuate these conditions (MacDonald, 1973). Persons aged 65 or over confined to nursing homes comprise only 5% of all individuals in that age group and are frequent targets for investigations of the elderly. Yet institutionalized elderly people might be unrepresentative of older persons as a whole. Elderly persons throughout the population present special psychological and physical problems that warrant special attention and treatment.

COMMON PROBLEMS

Continence

Continence is one such area in which both psychological and biological processes can influence the problem. This problem is very relevant to the elderly, as it is estimated that 85% of incontinents are age 65 or older (Atthowe, 1972). Behavioral approaches to the treatment of this problem have proven to be the most efficacious, and a number of investigators have attempted to devise specific approaches suited to older persons. One such study reporting mild success involved 100 nonambulatory geriatric inpatients (Spangler, Edwards, & Risley, 1977). The basic treatment approach involved hourly checking by a health care technician who offered prompts and physical assistance for proper toileting behavior. The authors were not entirely successful in eliminating incontinence in this severely disabled population, but they did report an increase in bowel and bladder control. Atthowe (1972) reported even better results in treating urinary incontinence in a group of 12 severely disabled and chronic patients. His treatment was part of an overall token economy program and involved an aversive phase (ward reassignment, nightly checks, etc.) and an aversion plus token reinforcement phase. He reported that at the end of treatment all of the subjects had become continent.

These two studies reported moderate to good success in the treatment of incontinence in the elderly, but the results of other investigators have been mixed. Grossicki (1968) treated a group of 20 neuropsychiatric

geriatric inpatients using social reinforcement or token reinforcement combined with response cost and reported no significant decrease in incontinence. Pollock and Liberman (1974) used a two-phase approach involving response cost and token reinforcement in the treatment of elderly incontinent demented inpatients and reported that some patients improved, whereas others worsened. Lastly, Collins and Plaska (1975) applied Mowrer's conditioning treatment to the geriatric residents of a nursing home and reported success in only 3 of 28 cases.

It is apparent that most of the research conducted to date on the problem of continence in the elderly has been restricted to inpatient populations. It might be the case that it is this population in which incontinence occurs most frequently. However, previous research on the treatmentof incontinence in children, which has reported success rates as high as 84% (Collins & Plaska, 1975), was not conducted on an inpatient population. In spite of this obvious difference, the question remains as to what accounts for the mixed results when these techniques are applied to the elderly. Conditionability might be an important variable here. Collins and Plaska (1975) speculated that they were not successful due to the impaired conditionability of geriatric patients and cite instances of impaired conditionability of other responses even in relatively normally functioning elderly persons. The answer could lie in increased numbers of learning trials for the elderly to achieve criterion responses. For instance, Atthowe's previously reported successful treatment required up to 7 months, an increased period of time that he accounted for by the advanced age of his subjects. In addition, conditionability might be improved by the use of more powerful reinforcers. Pollock and Liberman (1974) felt that they were not entirely successful because their reinforcers were not powerful enough. As changes occur with age, so might the value of reinforcers, and a sampling procedure such as advocated by Wisocki (1977) might be warranted to establish new reinforcers prior to undertaking any treatment.

Sexual Behavior

Sexuality is a topic rife with misconceptions and misunderstanding among individuals of all ages, but especially so for the elderly. When this is compounded by the problems arising from confinement to a nursing home, a total denial of opportunities for sexual expression can be the result (DeLeon, 1977). It is often the case that the staff of nursing homes has little objective information about aging. The belief often exists among both patients and staff that sexuality is behavior appropriate only for the young, a belief which can result in impotence, frustration, self-depreciation, and loneliness (Sviland, 1978).

Clearly, aging does produce some changes in human sexual response. Males and females both can experience higher thresholds of response, loss of libido, and loss of sensitivity (Sviland, 1978). Females, both during and

after menopause, can experience such diverse symptoms as hot flashes, depression, and genital atrophy (Seaman & Seaman, 1977). Males can experience a decline in the frequency of orgasm and an increase in the length of the refractory period as the aging process occurs (Kaplan, 1974). In spite of the well-documented existence of these changes in sexual response in the elderly, little systematic research into the treatment of these problems has been conducted.

Auerbach and Kilmann (1977) recently investigated the effects of group systematic desensitization on secondary erectile failure. The aim of treatment was to increase the percentage of successful episodes of sexual intercourse as compared to the number of attempted episodes. Although their treatment was generally successful, it was not directed solely at an elderly population; persons over the age of 65 were included in the groups only incidentally. A closer examination of the data revealed that one 66-year-old subject in the treatment group achieved successful intercourse only three of ten times. The question remains unanswered as to whether other variables due to aging might have contributed to this low rate of success. However, it might be the case that systematic desensitization is not the treatment of choice for elderly males experiencing secondary erectile failure.

The effects of aging on the sexual capacity of males is much greater than for females (Sviland, 1978). Cultural practices such as males marrying females substantially younger than themselves and beliefs that the male should be the active partner in any sexual relationship can serve to exacerbate the problems of the elderly. Therapy might require an examination of the belief system of an elderly couple and a restructuring of those beliefs so that both partners better understand the other's needs. The female might need to learn to take a more active role and the male might need to learn to adapt to this change in roles. Bibliotherapy can be a useful adjunct to this approach. Butler and Lewis (1976) have written a useful text entitled *Sex after Sixty: A Guide for Men and Women for Their Later Years,* which includes such topics as performance demands, normal physiological changes, and declining responsivity.

Sviland (1978) has proposed a program to enhance the sexuality of elderly couples that has met with moderate success. Her treatment approach is multimodal and includes an exploration of current attitudes and functioning, bibliotherapy, social skills training, and sensate focus exercises. More importantly, she points out a number of special considerations that are pertinent to sex therapy with older couples. They are as follows:

1. Couples can experience depression and sexual avoidance following goal success as they realize that their physical limitations interfere with the fulfillment of their new-found expectations. Regularly scheduled follow-up sessions are clearly indicated in such cases.

2. With advancing years, the male experiences distinct performance changes, whereas the female experiences fewer changes that are of less magnitude. Special techniques including role reorientation may be necessary to minimize these differential effects.
3. Couples who have been in a relationship spanning many years might have developed interactional patterns that are not conducive to improved sexual relations. Care should be taken to examine the total relationship and not merely to prescribe specific isolated tasks.
4. Often, the definition of what constitutes an improved sexual relationship differs between the two partners. Clearly defined, mutually agreed-upon goals are very important for therapy to succeed.

Self-Injurious Behavior

Self-injurious behavior (SIB) is an area of special concern with elderly patients that can occur with surprisingly high frequency, especially in institutionalized populations. Kastenbaum and Mishara (1971), in assessing the type and frequency of self-injurious behavior in an institutional population, noted that 44% of the men and 22% of the women engaged in some form of SIB over the course of 3 days. The SIB most frequently engaged in was abuse of another that resulted in adverse consequences. Other SIBs have also been noted, including not wearing clothes, scratching, refusing to eat, eating dangerous objects, and refusing to follow medical advice (Mishara, Robertson, & Kastenbaum, 1973). Suggestions for treatment include the use of positive reinforcement for appropriate behaviors and reinforcer sampling to increase the availability of other activities.

In one of the few reported studies in which SIB in the elderly was treated, Baltes and Lascomb (1975) used a combination of reinforcement of desired behaviors and time-out to eliminate potentially life-endangering screaming in an 80-year-old female nursing-home resident. Although this effort is certainly noteworthy, little else has been done to explore the efficacy of treatment for other forms of SIB or for persons living in the community. The life-threatening effects of failure to comply with prescribed medical regimens is particularly serious and might be more frequent among persons not living in a situation where frequent attention by staff is available. Certainly, approaches such as follow-up care, home visitations, and telephone or mail reminders to prompt compliance warrant investigation.

Hygiene and Self-Care

An area related to self-injurious behavior is hygiene and self-care behaviors, as neglect of these behaviors can have adverse consequences

on the health of an individual. This category includes such behaviors as nutritional compliance, self-feeding, and activities of daily living (ADL). Winkler (1970) used a token reinforcement combined with response cost paradigm successfully to increase ADL behaviors such as attendance at exercises, getting up and dressing, and bed making, while decreasing violence and noise behaviors. The subject population was chronic female psychiatric inpatients ranging in age from 20 to 85. Although no mention was made of the possible differential response of the older patients, the author did suggest that the passivity and nonresponsiveness often observed in these patients could be a function of staff reinforcement for these behaviors.

Eating well-balanced meals was the target in a recent study with a group of six geriatric inpatients (Geiger & Johnson, 1974). Treatment consisted of reinforcers suggested by the patients such as extra time in bed and uninterrupted conversation with the staff contingent on eating a nutritionally balanced meal. All the patients significantly increased their percentage of correct meals eaten with one patient improving from 0 to 91%. The success of this program is testimony to the utility of reinforcer sampling for geriatric patients to determine the most powerful reinforcers prior to instituting treatment.

Although the patients in the previous study were all capable of self-feeding, this is not always the case; other patients might need to be trained in self-feeding behaviors. Baltes and Zerbe (1976a, 1976b) utilized stimulus control, prompting procedures, and a modified time-out procedure to reestablish self-feeding in three individual cases. They were successful in increasing the number of mouthfuls eaten per meal from approximately 2 to 25.

In the only study investigating nutritional compliance in a population of older persons living in the community, Bunck and Iwata (1978) were able to increase participation in a community-based nutritious meal program. Their method included the use of prompts in the form of radio announcements, home visits, phone calls, and the use of incentives and activities following the meal. The incentives in the form of gifts like movie tickets and house plants were the most powerful in increasing participation as well as the most cost-effective method. Again, the authors suggest the selection of incentives that hold the most value for an elderly population.

Substance Abuse

Very little research exists in the area of substance abuse and elderly patients, and what little research has been done has only included older individuals as parts of larger groups of subjects. Abrahms and Allen (1974) used behavioral programs including social reinforcement and monetary remuneration to facilitate weight reduction in a group of obese females. Similarly, Musante (1976) used a multimodal behavioral approach that

included cognitive restructuring and stimulus control training to achieve weight loss in a group of obese males and females.

Aversion and self-regulation have been used successfully in a treatment program for alcoholics that included a number of geriatric patients (Caddy & Lovibond, 1976). A number of studies have included geriatric individuals in their investigation of treatments for cigarette smoking (Baer, Foreyt, & Wright, 1977; Keutzer, 1968; Ochsner & Damrau, 1970). These studies have utilized such diverse methodologies as self-control, aversive conditioning, and negative practice. It seems clear that this is an area that needs further investigation using techniques tailored to geriatric populations.

Cognitive and Emotional Problems

The aging process and concomitant problems such as sensory deficits and the stress of chronic illness can result in cognitive or emotional difficulties in the geriatric patient. Often, referral to a psychologist is used as a last resort and can be the result of continuing physiological complaints with no apparent organic cause (Epstein, 1977). This is particularly true of the elderly patient who resides in a nursing-home facility. Elderly persons living in the community usually continue to function adequately, even in the face of chronic disease states, until such time as an event occurs that cannot be coped with in the usual fashion. Events of this nature usually take the form of uncontrollable situations such as accidents or loss of a spouse (Simon, Lowenthol, Epstein, 1970).

Although it is often the case that cognitive disturbances are closely tied to physical problems or the presence of chronic disease conditions in the elderly, evidence also exists to support the notion of changes in cognitive function and response due to the developmental effects of aging. Noting that the elderly often exhibit cautiousness in responding during intellectual performance, Birkhill and Schaie (1975) investigated the effects of differential reinforcement on this performance characteristic. Using a group of 88 male and female residents of a housing project, the authors found that hesitancy is often due to reluctance to become involved when risk is high. Indeed, response was better on low-risk than on high-risk tasks when persons were given the option to respond or not. Clearly, this finding has implications for any cognitive assessment of elderly persons. When cognitive function appears to be impaired, individuals are often labeled "senile" and placed in an institution. The answer might lie in the design of methods for assessing cognitive functioning tailored to older individuals.

Assessment of cognitive functioning often involves memory tasks, and it has been found that what appears to be poor retention in the elderly person might instead be inadequate acquisition of the material (Hulicka & Weiss, 1965). While the elderly might learn less well than younger persons, recall is often not inferior given the amount of material learned.

These changes in learning ability, if not properly taken into account in any evaluation of the geriatric patient, can have untoward effects on the emotional functioning of the individual. Belluci and Hoyer (1975) found that elderly persons self-reinforced less and had fewer positive self-evaluations. It appears to be the case that as aging occurs self-appraisal becomes more dependent on external criteria. If the external criteria involve the use of evaluative techniques not entirely appropriate for elderly persons, the effects on that person's self-esteem and emotional stability can be disastrous.

When a person is labeled senile due to what appears to be impaired cognitive functioning, institutionalization is often the result, which in elderly persons can result in depression or even death. Blenker (1967) investigated the effects of such environmental change on the aging individual. He found that the death rate among persons placed in institutions was significantly higher than for populations remaining in the community. If intensive professional services are indicated, it might be better to provide these in the home rather than taking patients from familiar environments and placing them in unfamiliar ones. However, in those cases where placement is unavoidable, as with severely disabled persons, it might be wise to institute a systematic program as a preventive measure for emotional disturbances. Power and McCarron (1975) used a combination of patient contact, verbal reinforcement, and participation in planned activities to decrease staff ratings and self-reports of depression in a group of 30 nursing-home residents. At follow-up it was noted that once persons became involved in activities, further prompting was unnecessary and patients continued participation on their own. In addition, where placement is in a setting other than a nursing home, such as a housing project for the elderly, it would certainly seem reasonable to be aware of the needs and desired services of those persons residing there to assure continued functioning. In such cases, medical services are usually the most important item desired by the majority of residents (Lawton, 1969). The availability of such services certainly influences the emotional well-being of the residents and might have a preventive effect in regard to future emotional and cognitive problems.

When emotional problems do occur, they can involve withdrawal from an otherwise supportive environment. Hoyer, Kafer, Simpson, and Hoyer (1974) used group treatment methods combined with token reinforcement to combat this withdrawal behavior. Their target was increased verbal behavior with one another and the staff, and they were successful in achieving an increase in appropriate verbalizations. Patient communication with others was also increased in a unique approach designed to help patients receive more mail (Goldstein & Baer, 1976). Using verbal prompts and a communication skills training approach, they were able to help a group of nursing-home residents increase their correspondence and interaction with others. The utility of this approach lies in its simplicity and low cost.

Physiological and Biological Problems

Corso (1971) reviewed the research on the effects of aging on a number of sensory processes. He found decremental effects in vision and noted that the elderly can have problems due to their tendency to adhere to the initial perception of a stimulus rather than to reevaluate it at a later time. He noted that thresholds for perception and recognition increase with aging along with a decrease in pain sensitivity due to a variety of biological factors. There are also other areas, such as olfaction, in which changes might occur but have not been documented. Of particular note is his caution that these decrements have different age onsets and proceed at different rates.

Changes can also occur in the responses of the elderly in a number of somatic processes. Shmavonian, Miller, and Cohen (1970) used a classical conditioning paradigm to condition blood volume pulse and heart rate and found that aged subjects had, overall, poorer reactivity to the stimuli than younger subjects and that conditioning did not occur at all in the elderly patients. However, it might be the case that this particular methodology is not suited to elderly clients.

Elder and Eustis (1975) were able to obtain decreases in diastolic blood pressure in a group of outpatient hypertensives that included some subjects up to 80 years old. They utilized an instrumental learning approach involving visual feedback accompanied by verbal praise for desired changes in blood pressure. In a report of an individual case, Rappaport and Cammer (1977) used a multimodal approach to decrease essential hypertension in a 71-year-old male outpatient. Their approach involved training in relaxation and stress control coupled with breath meditation and electrodermal response biofeedback. The patient's blood pressure decreased from 170/105 to 135/90 following treatment, and these gains were maintained at an 8-month follow-up.

Various chronic disease states such as arthritis can make ambulation difficult in elderly patients, often resulting in unwarranted cessation of walking behavior. Sachs (1975) used a combination of verbal praise and prompts along with token reinforcement to increase the walking behavior of two elderly nursing-home residents. MacDonald and Butler (1974) were also able to reinstitute walking behavior in two nursing-home residents using prompts for standing and walking and verbal praise contingent on execution of these behaviors.

A number of other somatic disturbances in the elderly can also cause problems in functioning ranging from hypochondria to sleep disturbances (Nowlin & Busse, 1977). In general, aging produces a loss of reserve in terms of various physiological processes. Resting cardiac output is decreased, kidney function undergoes a gradual decline, and cerebral blood flow similarly decreases (Nowlin & Busse, 1977). Although the rate of decline can be slow, occurring over a period of many years, adjustment in either a physiological and a psychological sense need not proceed in a like

fashion, requiring intervention at some level. Though biomedical approaches can certainly go far to maximize the functional capacity of the elderly patient, they do not necessarily facilitate adaptation to these inevitable changes.

The impact of chronic disease states on the psychological well-being of elderly patients and their resultant demands for medical services is an important consideration in any delivery system. Byl and Clever (1977) found that a "disproportionate amount of services will be consumed by a small but identifiable percentage of the total health care population, i.e., those with stable chronic disease" (p. 414). As a solution to this inordinate demand placed on the health care system, they advocated the use of physician extenders and provision for psychological services as a supportive supplement to routine health maintenance.

TOKEN ECONOMIES

Nursing homes and other institutional settings are the residences of a significant number of geriatric patients, and such settings would seem to provide an opportunity for instituting behavioral programs involving large numbers of the population at one time. As token economies have been successful with other populations, it would seem to be an efficacious approach for geriatric residents. Winkler (1970) reports on a token economy program used with a population of chronic psychiatric patients of varying ages. Although the patients as a whole improved on such target behaviors as attendance at morning exercises and finishing those morning exercises, no separate report was given of the results for the older patients. Mishara (1971) reported on a comparison of a token economy program to a noncontingent token reinforcement program with a population of chronic geriatric psychiatric patients. Both groups improved, but the token economy ward was significantly better in the categories of ward work activities and social interaction, whereas no differences were observed for either hygiene or self-care. Token reinforcement has also been used to improve participation in an exercise program for hospitalized geriatric patients (Libb & Clements, 1969).

In a recent important analysis comparing a token economy to a general-milieu treatment program for geriatric patients, Mishara (1978) attempted to determine the characteristics of patients who responded best to the different programs. Overall, both programs were successful in facilitating behavioral changes in the desired direction. This result is particularly noteworthy as the population was a group of elderly patients with organic diagnoses who had previously been thought to be beyond help. Analysis of the data indicated that patients who benefited most from the token program were those patients who were characterized as less "institutionalized," were in better physical condition, and were actively exhibiting their troubles. As with any subgroup of the population,

stereotyping frequently occurs with geriatric patients. This study serves to demonstrate that improvement is possible where there previously seemed to be little potential and that patient selection for differential characteristics is warranted to maximize patient benefits.

STRESS MANAGEMENT AND BIOFEEDBACK

Garrison (1978) has suggested the use of stress management training to teach elderly clients to use relaxation as a self-control skill to cope with undesirable cognitive and physiological responses to stress. He outlined a seven-session training course that included (a) teaching the client to understand stress and to relax using an abbreviated form of progressive muscle relaxation combined with meditation, (b) home practice of relaxation and daily charting of tension levels, (c) practice of relaxation in nonthreatening real-life situations, and (d) generalization training for using relaxation to cope with increasingly more stressful situations. He successfully used this program with a 65-year-old agoraphobic and found that appropriate behavior was maintained at a 12-month follow-up. This intervention strategy can be viewed as an alternative to psychotherapy in that it is an educational process where the therapist becomes an educator who trains the client in the use of relaxation as a coping skill. The benefits of this approach include the possibility of group administration with increased client participation and compliance.

An educational coping skills enhancement approach can be especially appropriate for specific high-risk geriatric subgroups. For example, Furry (1977) points out that the prospect of retirement is problematical for most people. Type A individuals, for whom loss of control is a salient problem, may feel even more helpless in the face of the aging process and retirement, thus increasing the probability of developing coronary heart disease. An educational program dealing with these concerns should include attention to the problems of anticipated loss of control, denial as a defense mechanism, and avoidance of interpersonal closeness as well as exploration of alternative reinforcers and ways to manage free time. This can lead to positive changes in the client's expectations about the environment and the development of alternative coping strategies. In addition, an educational counseling format can foster the establishment of meaningful social bonds within that format that can also serve to reduce the risk of Coronary Heart Disease (CHD) in the type A individual. Systematic investigation is needed to confirm the value of preretirement counseling in the modification of type A pattern behaviors, age-related stress, and the prevention of negative attitudes toward aging.

Biofeedback techniques can also be conceptualized as self-control coping skills and can be especially useful in teaching geriatric persons relaxation skills. Specific electromyogram and/or temperature relaxation training techniques might be beneficial; Cautela (1969) has indicated that

geriatric clients usually take longer to learn to relax. The Task Force Study Section report on geriatrics and biofeedback prepared for the Biofeedback Society of America (Gaarder, 1978) concluded that

> biofeedback in geriatrics is unlikely to offer a total therapeutic approach to the patient. As elsewhere, biofeedback is usually only part of a package of therapeutic approaches in a particular situation, and the total context of treatment has over-riding influence. Usually the specific biofeedback technique has evolved in a setting that is not exclusively geriatric. Thus, the consideration of geriatrics and biofeedback gets down to a consideration of the biofeedback treatment of specific conditions that are commonly found in the elderly. (p. 1–2)

Biofeedback techniques appear promising in the treatment of fecal incontinence, especially in nursing-home populations, and in physical rehabilitation after stroke. The applicability of biofeedback in the treatment of other conditions common in the elderly has not yet been convincingly demonstrated. However, biofeedback can be used as a nonspecific element in a therapeutic program designed to improve the general well-being of the elderly and merits further examination on both counts.

ETHICS

One final concern when using behavioral methodologies with geriatric populations is the ethical implications of such an approach. This is a particularly salient issue when considering the institutionalized elderly, who are often more dependent on the staff and others for their welfare than elderly persons living in the community. Apparent abuses involving various behavioral treatment modalities in institutional settings have been reported. Finesmith (1979) reported one instance in which an elderly man was placed in a geriatric chair in a time-out situation for up to 11 hours as a treatment for screaming behavior when his screaming was due, in part, to a previously undiagnosed broken hip. This however, is an example where behavior therapy guidelines were not followed and behavioral principles were misunderstood and misapplied. The development of such guidelines and close adherence to them is important to maximize the quality of care for elderly patients.

MacDonald (1976) has recommended that, when behavioral techniques are used with the elderly, it is important that (a) there be a reasonable expectation of benefit for the patient, (b) informed consent be obtained, and (c) the effects of treatment be carefully and continuously measured and monitored. More specific sets of guidelines have been developed by the Wisconsin Division of Community Services (Finesmith, 1979) and by the Association for Advancement of Behavior Therapy (1977). These guidelines should be consulted and closely followed whenever behavioral methodologies are used with elderly individuals, whether institutionalized or living in the community.

REFERENCES

Abrahms, J. L., & Allen, G. J. Comparative effectiveness of situational programming, financial pay-offs and group pressure in weight reduction. *Behavior Therapy*, 1974, *5*, 391–400.

Association for Advancement of Behavior Therapy. *Ethical issues for human services.* New York: Author, 1977.

Atthowe, J. M. Controlling nocturnal enuresis in severely disabled and chronic patients. *Behavior Therapy*, 1972, *3*, 232–239.

Auerbach, R., & Kilmann, P. R. The effects of group systematic desensitization on secondary erectile failure. *Behavior Therapy*, 1977, *8*, 330–339.

Baer, P. E., Foreyt, J. P., & Wright, S. Self-directed termination of excessive cigarette use among untreated smokers. *Journal of Behavior Therapy and Experimental Psychiatry*, 1977, *8*, 71–74.

Baltes, M. M., & Lascomb, S. L. Creating a healthy institutional environment for the elderly via behavior management: The nurse as change agent. *International Journal of Nursing Studies*, 1975, *12*, 5–12.

Baltes, M. M., & Zerbe, M. Independence training in the nursing home resident. *Gerontologist*, 1976, *16*, 428–432. (a)

Baltes, M. M., & Zerbe, M. Re-establishing self-feeding in a nursing home setting. *Nursing Research*, 1976, *25*, 24–26. (b)

Belluci, G., & Hoyer, W. J. Feedback effects on the performance and self-reinforcing behavior of elderly and young adult women. *Journal of Gerontology*, 1975, *4*, 456–460.

Birkhill, W. R., & Schaie, K. W. The effect of differential reinforcement of cautiousness in intellectual performance among the elderly. *Journal of Gerontology*, 1975, *5*, 578–583.

Blenker, M. Environmental change and the aging individual. *Gerontologist*, 1967, *71*, 101–105.

Bunck, T. J., & Iwata, B. A. Increasing senior citizen participation in a community-based nutritious meal program. *Journal of Applied Behavior Analysis*, 1978, *11*, 75–86.

Butler, R., & Engel, B. Psychosomatic medicine and aging research. *Psychosomatic Medicine*, 1978, *40*, 365–367.

Butler, R., & Lewis, M. *Sex after sixty: A guide for men and women for their later years.* New York: Harper & Row, 1976.

Byl, N., & Clever, L. Stable chronic disease: A behavioral model. *Journal of the American Geriatrics Society*, 1977, *25*, 408–414.

Caddy, G. R., & Lovibond, S. H. Self-regulation and discriminated aversive conditioning in the modification of alcoholics' drinking behavior. *Behavior Therapy*, 1976, *7*, 223–230.

Cautela, J. R. A classical conditioning approach to the development and modification of behavior in the aged. *Gerontologist*, 1969, *9*, 109–113.

Collins, R. W., & Plaska, T. Mowrer's conditioning treatment for enuresis applied to geriatric residents of a nursing home. *Behavior Therapy*, 1975, *6*, 632–638.

Corso, J. F. Sensory processes and age effects in normal adults. *Journal of Gerontology*, 1971, *26*, 90–105.

DeLeon, J. *Intimacy, sexuality and the elderly: The nursing home experience.* Paper presented at the meeting of the American Psychological Association, San Francisco, 1977.

Eisdorfer, C., & Cohen, D. The cognitively impaired elderly: Differential diagnosis. In M. Storandt, I. Siegler, & M. Elias (Eds.), *The clinical psychology of aging.* New York: Plenum Press, 1978.

Elder, S. T., & Eustis, N. K. Instrumental blood pressure conditioning in outpatient hypertensives. *Behaviour Research and Therapy*, 1975, *13*, 185–188.

Epstein, L. The medical practitioner and the elderly disturbed patient. In C. Eisdorfer & R. Friedel (Eds.), *Cognitive and emotional disturbance in the elderly.* Chicago: Year Book Medical Publishers, 1977.

Finesmith, B. K. An historic and systemic overview of Wisconsin's behavior management guidelines. *The Behavior Therapist*, 1979, *2*, 3–6.

Furry, C. *The type-A personality: Implications and suggestions from a gerentological viewpoint.* Paper presented at the symposium "Modification of Type-A Behavior to Reduce Risk of Heart Disease" at the American Psychological Association meeting, San Francisco, August 1977.

Gaarder, K. R. *Geriatrics and biofeedback task force study section report.* Denver: *Biofeedback Society of America.* August 1978.

Garrison, J. E. Stress management training for the elderly: A psychoeducational approach. *Journal of the American Geriatric Society,* 1978, *26,* 397–403.

Geiger, O. G., & Johnson, L. A. Positive education for elderly persons: Correct eating through reinforcement. *Gerontologist,* 1974, *14,* 432–436.

Gentry, W. D. Psychosomatic issues in assessment. In M. Storandt, I. Siegler & M. Elias (Eds.), *The clinical psychology of aging.* New York: Plenum Press, 1978.

Goldstein, R. S., & Baer, D. M. RSVP: A procedure to increase the personal mail and number of correspondents for nursing home residents. *Behavior Therapy,* 1976, *7,* 348–354.

Grossicki, J. P. Effect of operant conditioning on modification of incontinence in neuropsychiatric geriatric patients. *Nursing Research,* 1968, *17,* 304–311.

Hoyer, W. J., Kafer, R. A., Simpson, S. C., & Hoyer, F. W. Reinstatement of verbal behavior in elderly mental patients using operant procedures. *Gerontologist,* 1974, *14,* 149–152.

Hoyer, W., Mishara, B., & Reidel, R. Problem behaviors as operants: Applications with elderly individuals. *Gerontologist,* 1975, *15,* 452–456.

Hulicka, J. M., & Weiss, R. L. Age differences in retention as a function of learning. *Journal of Consulting Psychology,* 1965, *29,* 125–129.

Kaplan, H. *The new sexual therapy.* New York: Brunner/Mazel, 1974.

Kastenbaum, R., & Mishara, B. L. Premature death and self-injurious behavior in old age. *Geriatrics,* 1971, *26,* 70–91.

Keutzer, C. Behavior modification of smoking: The experimental investigation of diverse techniques. *Behaviour Research and Therapy,* 1968, *6,* 137–157.

Lawton, M. P. Supportive services in the context of the housing environment. *Gerontologist,* 1969, *9,* 15–19.

Levine, D. M. Staffing patterns and professional profiles of the health care manpower. *Gerontologist,* 1975, *15,* 314–316.

Libb, J. W., & Clements, C. B. Token reinforcement in an exercise program for hospitalized geriatric patients. *Perceptual and Motor Skills,* 1969, *28,* 957–958.

Lindsley, O. R. Geriatric behavioral prosthetics. In R. Kastenbaum (Ed.), *New thoughts on old age.* New York: Springer, 1964.

MacDonald, M. L. The forgotten Americans. A sociopsychological analysis of aging and nursing homes. *American Journal of Community Psychology,* 1973, *1,* 272–294.

MacDonald, M. L. The ethics of using behavior modification with the institutionalized aging: A practical analysis. *Journal of Long-Term Care Administration,* 1976, *4,* 42–46.

MacDonald, M. L., & Butler, A. K. Reversal of helplessness: Producing walking behavior in nursing home wheelchair residents using behavior modification procedures. *Journal of Gerontology,* 1974, *29,* 97–101.

Mishara, B. L. *Comparison of two types of milieu programs for rehabilitation of chronic geriatric "mental" patients.* Paper presented at the 24th annual meeting of the Gerontological Society, Houston, 1971.

Mishara, B. Geriatric patients who improve in token economy and general milieu treatment programs: A multivariate analysis. *Journal of Consulting and Clinical Psychology,* 1978, *23,* 367–378.

Mishara, B. L., Robertson, B., & Kastenbaum, R. Self injurious behavior in the elderly. *Gerontologist,* 1973, *13,* 311–314.

Musante, G. J. The dietary rehabilitation clinic: Evaluative report of a behavioral and dietary treatment of obesity. *Behavior Therapy,* 1976, *7,* 198–204.

Nowlin, J., & Busse, E. Psychosomatic problems in the older person. In E. Wittkower & H. Warnes (Eds.), *Psychosomatic medicine.* Hagerstown, Md.: Harper & Row, 1977.

Ochsner, A., & Damrau, F. Control of cigarette habit by psychological aversive condition-

ing: Clinical evaluation in 53 smokers. *Journal of the American Geriatrics Society,* 1970, *18,* 365–369.

Paton, R. *Issues and implications of long term care: A review.* Paper presented at the meeting of the Southeastern Psychological Association, Atlanta, 1978.

Pollock, D. D., & Liberman, R. P. Behavior therapy of incontinence in demented inpatients. *Gerontologist,* 1974, *14,* 488–491.

Power, C. A., & McCarron, C. T. Treatment of depression in persons residing in homes for the aged. *Gerontologist,* 1975, *15,* 132–135.

Rappaport, A. F., & Cammer, L. Breath meditation in the treatment of essential hypertension. *Behavior Therapy,* 1977, *8,* 269–270.

Reichel, W. Demographic aspects of aging. In W. Reichel (Ed.), *Clinical aspects of aging.* Baltimore: Williams & Wilkins, 1978.

Sachs, D. A. Behavioral techniques in a residential nursing home facility. *Journal of Behavior Therapy and Experimental Psychiatry,* 1975, *6,* 123–127.

Schwartz, G., & Weiss, S. Behavioral medicine revisited: An amended definition. *Journal of Behavioral Medicine,* 1978, *1,* 249–251.

Seaman, B., & Seaman, G. *Women and the crisis in sex hormones.* New York: Rawson Associates, 1977.

Shmavonian, B. M., Miller, L. H., & Cohen, S. I. Differences among age and sex groups with respect to cardiovascular conditioning and reactivity. *Journal of Gerontology,* 1970, *25,* 87–94.

Simon, A., Lowenthol, M. F., & Epstein, L. J. (Eds.). *Crisis and intervention: The fate of the elderly mental patient.* San Francisco: Jossey-Bass, 1970.

Spangler, P. F., Edwards, K. A., & Risley, T. R. *Behavioral care of nonambulatory geriatric patients.* Paper presented at meeting of the Association for the Advancement of Behavior Therapy, Atlanta, 1977.

Sviland, M. Helping elderly couples become sexually liberated: Psychosocial issues. In J. LoPiccolo & L. LoPiccolo (Eds.), *Handbook of sex therapy.* New York: Plenum Press, 1978.

Whelihan, W. M. *Psychotherapy with elderly clients: A behavioral approach.* Paper presented at the meeting of the American Psychological Association, Toronto, 1978.

Winkler, R. C. Management of chronic psychiatric patients by a token reinforcement system. *Journal of Applied Behavior Analysis,* 1970, *3,* 47–55.

Wisocki, P. A. *Sampling procedures: Tools for stimulating the activity and interest of institutionalized elderly.* Paper presented at the meeting of the American Psychological Association, San Francisco, 1977.

The Chronically Anxious Patient

JERRY L. DEFFENBACHER AND RICHARD M. SUINN

CHRONICALLY ANXIOUS AND STRESSED PATIENTS

Anxiety, tension, and stress are significant and pervasive problems in our society, so much so that the twentieth century has sometimes been called the Age of Anxiety. The magnitude of anxiety-related problems is reflected by the fact that Valium and Librium are two of the most frequently prescribed drugs in this country. The major focus of this chapter will be on the chronically anxious patient, the patient who experiences an extreme degree and amount of anxiety. Although the chronically anxious patient will be our primary focus, we will also discuss briefly stress–disease relationships in other patients.

Describing the chronically anxious patient often becomes circular. The chronically anxious are individuals who experience pervasive, repeated anxiety. Much of the problem is in defining the nature of anxiety, which is no easy task. One useful way of approaching this problem is to view the anxiety state as as inferential construct (Lang, 1969; Suinn, 1977b) based on data from one or more of three behavioral domains. One is the *affective-physiological channel*. Anxiety is characterized or defined by subjective feelings of apprehension, dread, and tension. These feelings are often accompanied by increased automatic arousal, for example increased heart rate, blood pressure, palmar sweating, and respiration rate. The second domain is the *cognitive channel*. Anxiety is reflected in

JERRY L. DEFFENBACHER AND RICHARD M. SUINN • Department of Psychology, Colorado State University, Fort Collins, Colorado 80521.

overt verbal statements regarding anxiety such as "I'm really tense," and by covert imaginal and verbal patterns that are usually negative, over-generalized, and distorted such as "I know I'm going to fail; they'll all laugh at me, and I'll just fall apart." The third domain is the *somatic-behavioral channel*. Here, anxiety is inferred in such behaviors as motor tremor, speech dysfluencies, avoidance behaviors, and the disruption of performance. One of the problems affecting the making of reliable judgments about anxiety is the fact that these behavioral channels are not necessarily correlated for any given patient. In fact, a patient might show some but not all of the "signs" of anxiety in a given situation. For example, a person can report extreme worry (cognitive), appear flushed and sweaty (affective-physiological), and yet approach and confront the anxiety-arousing situation (somatic-behavioral).

Although these measures of anxiety are not perfectly correlated, the chronically anxious, on the whole, tend to experience significant disruptions in all three. They often experience intense feelings of apprehension and dread of imminent danger, which are accompanied by elevations in one or more autonomic response parameters. They talk about being tense, anxious, and stressed; they describe themselves and the world in negative, threatening ways. They often show tremor, disruption of motor and/or speech behavior, and avoidance behaviors. Unlike the phobic whose anxiety rises and falls with the presence or absence of the feared situation, they seem nearly always to experience an elevated level of state anxiety that is punctuated with periods of acute anxiety. Their anxiety seems more general, pervasive, and "free floating," or a general trait (all of these terms are used interchangeably in this chapter). They are the kind of person who others label "tense" or "uptight all the time" and who we shall refer to as the chronically anxious patient.

Chronic anxiety is disruptive at a psychological level, and it is also related to disease processes in important ways (these will be described in the next section). For example, some of the physiological symptoms, such as diarrhea and nausea, can be medical problems in their own right or can serve to exacerbate other disease processes. Chronic anxiety can also increase the risk or the severity of some diseases, such as atherosclerosis (Jenkins, Zyzanski, Ryan, Flessas, & Tannenbaum, 1977). Additionally, chronic anxiety can interfere with the adequate diagnosis and treatment of disease.

General life stress has been implicated in the development of and susceptibility to disease. For example, Rahe and Lind (1971) found that greater amounts of recent life change (stress) were related to increased chances of sudden cardiac death. Spilken and Jacobs (1971) linked the amount of life change to the development of serious respiratory illness. Holmes (1970) related the amount of life change to a greater risk of a number of major and minor health changes. It has been postulated that greater life change places greater demands on the adaptive capacity of the organism, thereby lowering bodily resistance to disease. To the extent

that a portion of this stress is due to faulty coping strategies, the individual experiences an unnecessary degree of stress and an increased probability of disease as the body's resistance is lowered unnecessarily.

Other more specific stress-related behavior patterns have been linked to disease as well. For example, the type A behavior pattern, in which individuals drive themselves to work aggressively and competitively under constant time pressure, is significantly correlated with increased risk of heart disease. Friedman and Rosenman (1959) demonstrated that approximately seven times more type A men exhibited signs of coronary disease than did type B men. Type A men also had higher cholesterol levels and faster blood-clotting times. A later study (Rosenman & Friedman, 1961) revealed similar patterns for women; type A women showed four times greater incidence of coronary disease, higher cholesterol levels, faster blood-clotting times, and greater tendencies toward hypertension. Thus, whether looking at chronic anxiety, general life stress, or specific stress-related behavior patterns such as the type A pattern, stress has been significantly related to the incidence of various disease processes and must be reckoned with as a factor in the conceptualization and treatment of disease.

CHRONIC STRESS IN RELATION TO DISEASE AND ITS TREATMENT

Chronically elevated levels of stress and anxiety are noxious and undesired at a purely psychological level and worthy of treatment in their own right. The psychological well-being of the individual and quality of life experienced could be significantly improved with treatments that lower such chronic anxiety. Nonetheless, chronic anxiety is implicated in other ways in physiological disease processes since the development of many diseases appears to involve both stress and nonstress factors. In some processes (e.g., wounds resulting from physical trauma or organ system dysfunction resulting from genetic defect), nonstress factors are implicated almost entirely. In others, however, stress factors such as those experienced by the chronically anxious play a significant, if not a dominant, role.

In some disease processes, stress can play a *causative* role. For example, unrelieved stress seems to contribute directly to the development of psychophysiological disorders in individuals who have a vulnerable physiological system and who do not possess skills with which to reduce the stress (Rimm & Sommervill, 1977). Anxiety reactions appear to increase the probability of psychophysiological disorders such as essential hypertension and migraine or tension headaches. Not surprisingly, chronically anxious persons report and experience greater incidence of such disorders, compared to the normal population. Thus, chronic anxiety might contribute directly and cause or trigger some disease processes.

In other situations, the connections between stress and disease are much less directly substantiated. In these cases the role of stress is more *correlational* or *associational.* That is, chronic stress is associated with greater incidence and/or severity of the disease process, but the mediational links between stress and the illness are not fully understood. The relationships of stress, type A behavior patterns, and coronary artery disease described previously provide an example of such correlational role relationships. Individuals characterized by type A patterns appear to experience both greater amounts of stress and greater proneness to coronary disease, but the ways in which the stress and disease are connected are far from clear. For the present, they remain only associated factors.

Chronic anxiety and stress can also serve as *exacerbating* forces on diseases caused primarily by nonstress factors. In some cases, stress directly worsens physiological symptoms such as dermatological conditions caused by toxic agents. The symptoms might not have been caused by the stress but still might have been made significantly worse by the stress. In other cases, stress further taxes the physiological capacity of the organism to respond at a time when its resources are already diminished. In either instance, the physiological resources to heal and repair are further lowered and the chances of a speedy recovery without complications are reduced by the presence of stress (Selye, 1956).

Unrelieved stress can influence disease processes indirectly through its effects on treatment-related behaviors. Anxiety is aversive and can lead to a wide range of avoidance behaviors. It becomes an *interfering* factor to the extent that it motivates avoidance behaviors that interrupt diagnostic and/or treatment procedures. In turn, the disease can worsen as it is not receiving proper medical attention. The interfering effects of chronic anxiety can take many different forms. For example, an anxious individual might simply avoid seeing the physician or other medical personnel. Failure to make or keep dental or medical appointments are examples of this type of interference. Anxiety can decrease the chances that a patient will appropriately implement a medical regimen. For example, the chronically anxious patient might not go on a diet as prescribed because to do so would elicit too much anxiety about personal health and body image. Anxiety can interact in a similar way to disrupt maintenance of a treatment program. The patient might start a program but fail to stay on it because of the increased anxiety level.

Chronic anxiety can also influence treatment by its influence on treatment personnel who deliver health care. The behavior of chronically anxious patients is often aversive to others around them, and they might, as a result, receive a variety of negative labels by the staff who must deal with them. As staff avoid and distance themselves, the probability of quality diagnostic and treatment procedures decreases. Regardless of the form of interference, chronic anxiety can influence treatment delivery negatively for an individual whose psychological and physiological resources are already minimal or severely drained.

All of these factors suggest the importance of interventions to reduce psychological stress in populations such as the chronically anxious. If a disease process is determined entirely by nonstress factors, then stress-reducing skills would still be of help in aiding individuals to cope with the psychological stresses caused by the disease. They would be better able to weather the course and treatment of the disease. The importance of stress reduction is even greater for diseases involving both stress and nonstress factors. If the individual does not have adequate coping skills, he or she faces greater chance of disease or severity of the disease as stress factors add significantly to the equation. Furthermore, the individual can suffer additional medical problems that result from stress not being relieved over the course of the disease. To the extent that chronically anxious patients can develop stress-reducing coping skills, they might not only be improving their psychological well-being but also might be reducing the impact of stress on the development, diagnosis, and treatment of the disease. Treatment designed to develop such stress-reducing coping skills could be offered preventively to reduce the possible impact of stress factors or remedially to influence the course of treatment and possible recurrence of the disease.

ANXIETY MANAGEMENT TRAINING

Anxiety management training (AMT) is one procedure that can be used to assist chronically anxious individuals in the development of needed coping skills.

History and Model

Systematic desensitization (see Chapter 4) is a very effective method for treating situational anxieties or phobias. However, it has some serious limitations in the treatment of chronically anxious persons. Systematic desensitization (Wolpe, 1969) requires that patients be able to specify the anxiety-arousing cue conditions so these can be arranged into a graded hierarchy. It is exactly this dimension on which chronically anxious persons have great difficulty. Their anxieties appear to be elicited not by specific external cue conditions but by vague internal cues and/or by multiple, complex patterns of external cues. Their anxieties are much more pervasive or "free floating," making desensitization either practically impossible or extremely arduous as many different hierarchies must be developed and desensitized. Additionally, the effects of desensitization are limited primarily to the fears desensitized. Patients are not typically trained in generalized coping skills that can be used to handle diverse sources of stress and anxiety.

Anxiety management training was developed to overcome problems related to the treatment of chronic or free-floating anxiety (see Suinn,

1975a, 1977a, for greater theoretical detail). This was done by introducing four new steps not offered by desensitization. First, patients are trained not only in basic progressive relaxation procedures, but also in additional methods of inducing relaxation quickly and effectively. That is, patients develop the basic relaxation response and also learn ways of applying it for *in vivo* tension control. Second, the locus of cuing relaxation is altered. The anxiety response itself becomes the cue condition for applying relaxation, rather than external situational cues. Anxiety becomes not only a response, but also a signal to cope as patients are trained to be aware of the response-produced cues of anxiety arousal—for example, increased muscle tension in the neck and shoulders, clenched jaws or fists, upset stomach, or dryness of mouth—and to use these "early warning cues" of anxiety arousal to begin applying relaxation coping skills. Hierarchies, therefore, are not needed because the cues for anxiety reduction are the cue properties of anxiety itself. Third, patients are provided considerable practice in chaining these skills together. Within therapy sessions imagery is used to elicit anxiety and provide patients with the opportunity of becoming aware of and relaxing away experienced tension. Homework focuses on generalizing these skills to the external world. Fourth, patients are taught self-control through being gradually and systematically trained in the self-management of anxiety. In essence, AMT trains patients to attend to the proprioceptive cues of anxiety arousal and apply relaxation coping skills to increases in these cues; practice is continued until patients become proficient at recognizing and reducing the stress response through self-control.

In this manner AMT develops generalized coping skills, as patients are trained to recognize tension and apply relaxation whenever and wherever stress is experienced. These anxiety reduction skills transfer across a wide range of stressful circumstances because the cues for relaxation are the internal, response-produced cues of anxiety, rather than specific external stimuli. Thus, chronically anxious patients receiving AMT are trained in a highly portable set of coping skills with which to combat tension, regardless of its source. Such patients are no longer at the mercy of free-floating anxiety.

The Procedure

Generally, AMT takes from five to eight weekly sessions, with each session lasting approximately an hour. Although procedures must be tailored to each individual case, a rough session by session outline is presented below.

Session 1. The goals of the first session following the completion of assessment are twofold. The first goal is to present the therapeutic rationale as training in self-control. Anxiety management training is described as training patients to recognize and control stress. Patients are told that as they practice and become proficient with AMT, they will be

able to cope with and actively reduce tension rather than being a victim of it. The second goal is to develop a strong relaxation response that can be adapted as a coping skill. This is done through traditional Jacobsen relaxation training procedures that typically take 20–35 minutes. At the end of the progressive-relaxation exercises, patients deepen relaxation further by taking slow, deep breaths, relaxing with each exhalation, and by imaging a personally relaxing scene. Then they are given relaxation practice as a homework assignment. They are to set aside approximately 45 minutes where they can be unhurried and uninterrupted and practice the progressive-relaxation exercises. They are to practice in this manner from four to six times before the next session. Emphasis is placed on client practice of relaxation as a means of developing a skill on their own, and the use of relaxation tapes is generally discouraged because it can foster a dependency on resources other than the patient's own abilities.

Session 2. The second session begins with a review of the relaxation homework. Compliance and the areas of success and difficulty are explored. If good control over relaxation has been achieved, then the focus shifts to the development of an anxiety-arousing scene. Often the first scene developed is one involving significant, but not maximally intense, anxiety arousal. This is done to maximize success and minimize too great a level of anxiety arousal. The scene should be a clear, concrete real experience of the patient's rather than an amalgam of fantasy features. Relaxation induction, preferably without muscle tensing, is then initiated. The deep-breath technique and the relaxation scene are practiced to further deepen and control relaxation. When the patient is deeply relaxed, the therapist asks the patient to switch on the anxiety scene, to experience the anxiety, and to signal when he or she has become anxious. When the patient signals anxiety arousal, the therapist instructs her or him to clear the scene and to switch on the personal relaxation scene, retrieving deep relaxation and signaling when again deeply relaxed. Relaxation is deepened further through the deep-breathing technique following the client signal. The initial presentation of the anxiety scene is generally brief (10–15 seconds) to avoid anxiety arousal that is too high. The anxiety scene is represented in an analogous manner two to four more times in the session, but with longer exposure (20–30 seconds), leaving approximately 10 minutes for a detailed interview regarding the experiences within the session. Relaxation homework involves relaxation without tensing, if the patient has progressed to that degree, and is augmented by the deep-breath procedures. Patients are also instructed to avoid anxiety-arousing situations if possible, as their coping skills are not sufficiently strong at this point.

Session 3. This session begins with an interview to check relaxation practice. Then patients are instructed to relax themselves by whatever procedure works best for them and to signal when deeply relaxed. When relaxation is signaled, the therapist switches on and describes the anxiety scene. Patients allow the anxiety to build and pay attention to the cues

associated with the elevation in anxiety. Scenes are held longer, generally
for a minute or so, with an emphasis on becoming aware of the cues of
tension. The therapist reinstitutes relaxation through instructions to
shift to the relaxation scene, to the deep-breathing technique, or to focus
on and let tension go. Time permitting, this arousal-relaxation sequence
is repeated three to five times. The ability to retrieve relaxation easily and
quickly and to discriminate the "early warning" aspects of anxiety
arousal are explored in the postexercise interview. Homework for this
session is the same as for session 2.

Session 4. Relaxation practice is again checked, and an additional
more highly arousing scene is developed. In the previous three sessions,
the therapist has maintained maximal control of scene exposure and re-
laxation retrieval. In this session, control and responsibility are shifted
partially to the patient. Using both moderate- and high-arousal scenes,
the therapist instructs patients to imagine the scene, to experience the
arousal, then to self-terminate the scene and relax by whatever method
works best, signaling when deeply relaxed. Four to six presentations are
made in this format, using the new scene on half of the presentations.
Homework assignments reflect the shift to the application of relaxation
in real-life situations; patients continue relaxation practice, but now
begin applying relaxation coping skills by checking their "early warning"
cues for building stress and relaxing it away any time it is felt.

Session 5. This session parallels session 4 except that patients con-
tinue to imagine the anxiety-arousing scene and actively relax away ten-
sion within the scene rather than terminating the scene first. This stage
represents a self-managed coping process as the patient experiences anx-
iety arousal and actively relaxes it away while staying in the imagined
setting. Homework again emphasizes *in vivo* practice of coping skills.

Sessions 6–8. When needed, these sessions are employed to further
strengthen relaxation coping skills. The method is the same as that of
session 5, with perhaps an additional high-arousal scene introduced. The
emphasis is on the consolidation of coping skills and the successful appli-
cation of these skills in stressful life circumstances.

The Research

Generalized Anxiety

Initial evaluations of AMT involved college students with debilitat-
ing situational anxieties. For example, in their initial study Suinn and
Richardson (1971) found that AMT significantly reduced math and test
anxieties in college students and that AMT was as effective as desensiti-
zation methods. Richardson and Suinn (1973) replicated these findings for
math anxiety. Deffenbacher and Shelton (1978) demonstrated that AMT
effectively reduced test anxiety in clients seeking services at the univer-

sity counseling center and that it was as effective as desensitization. However, at 6-week follow-up, some data suggested that AMT was superior to desensitization in the reduction of test anxiety. Similar results have been found for speech anxious students. Both Edie (1972) and Nicoletti (1972) showed that AMT significantly reduced public-speaking anxieties.

These studies show that AMT can effectively decrease specific situational anxieties or phobias. This raises the question of its effects on more general-trait or free-floating anxiety characteristics of the chronically anxious patient. Here, too, the evidence suggests that AMT is very effective. A series of studies treated clients for a specific situational anxiety but determined the extra effects of treatment on general or trait anxiety experienced by the clients. For example, Deffenbacher and Shelton (1978) found that AMT produced reductions in general anxiety in students seeking treatment for test anxiety. Furthermore, a 6-week follow-up showed that the gains in general-anxiety reduction were superior to those produced by desensitization. Nicoletti (1972) also found reduction in trait anxiety in speech anxious students treated with AMT. These two studies suggest that clients are learning generalized coping skills and are experiencing generalized anxiety reduction even though AMT focused primarily on treatment of specific anxieties.

Nicoletti (1972) and Edie (1972) treated students seeking treatment for chronic, free-floating anxiety. Both studies revealed significant reductions in general-trait anxiety level for students treated with AMT. Hutchings, Denney, Basgall, and Houston (1978) also treated chronically anxious college students with AMT. It reduced levels of trait anxiety, levels of state anxiety under evaluative stress, and the frequency of maladaptive cognitive coping skills in the face of evaluative stress. It was also as effective as applied relaxation, another self-managed coping skills approach to anxiety reduction. Berghausen (1977) applied AMT to individuals from the community who responded to advertisements offering treatment for chronic anxiety. He found that AMT significantly lowered general anxiety levels in this population and that these gains were maintained at follow-up. Nally (1975) found that AMT not only reduced general anxiety but also improved social behavior and self-concept in adjudicated adolescent delinquents in a residential treatment center.

Suinn (1976) reported a successful application of AMT with an anxious outpatient. Over the course of AMT, this patient was able to apply relaxation to reduce panic and regain emotional composure. Shoemaker (1976) reported the first comparative outcome study with diagnosed anxiety neurotics from a mental health clinic population. In this study AMT led to significant reductions in general-trait anxiety, and these improvements were maintained at follow-up. Additionally, AMT was more effective in reducing the general anxiety of anxiety neurotics than either implosion therapy or relaxation training treatment.

To summarize the research presented thus far, AMT appears not only

to reduce specific anxieties but also to develop generalized coping skills in clients whose specific anxieties were treated with AMT. In addition, AMT appears as effective as, and in some cases more effective than, other standard treatment strategies such as desensitization in dealing with situation-specific anxieties. Anxiety management training was also effective in reducing general anxiety in students, community volunteers, and delinquents seeking treatment for chronic anxiety. In treating anxiety neurotics, AMT again significantly lowered levels of trait anxiety and was more effective than other treatments such as implosion. Thus, the research literature suggests that AMT effectively reduces both specific and general anxieties in truly chronically anxious populations as well as student or other populations suffering from anxiety problems.

Use of AMT with Medical Disorders

Anxiety management training has also been applied successfully to medical disorders in which stress plays a significant role. Since these disorders are of prime interest here this research will be reviewed in greater detail.

Bloom and Cantrell (1978) reported the application of AMT to essential hypertension during pregnancy. The patient was a 35-year-old woman who was pregnant for the first time. Elevations in blood pressure as high as 160 systolic and 90 diastolic were noted early in the first trimester. Pharmacological therapy was not the preferred mode of treatment because of concern for the developing fetus. Following a baseline period of blood pressure recording, AMT was applied over six weekly sessions. Average daily blood pressure for the week immediately posttreatment was 118 systolic and 77 diastolic. The average weekly blood pressure readings over the 8-week follow-up was 124 systolic and 81 diastolic. The remainder of the pregnancy was uncomplicated and resulted in the birth of a healthy child. Anxiety management training thus affected blood pressure reductions and maintenance to within normal limits and reduced the possible negative side effects of medication. The training also holds promise for the treatment of hypertension and other stress-related disorders during pregnancy or other times when medication is undesirable due to possible side effects.

The high level of stress presumed in type A behavior patterns would also appear to be an appropriate target for AMT, as in many ways the type A pattern appears to be a description of an individual who is chronically stressed. Such individuals are characterized by a chronic sense of time urgency, high rates of both mental and physical activities, a sense of being driven but with poorly defined goals, involvement in multiple activities at the same time, aggressiveness and hostility, indiscriminant competitiveness, and self-imposed, often unrealistic deadlines for nearly every type of task. Some of these characteristics, such as greater hostility and rapid pace of activity, might reflect directly increased arousal and stress.

Other characteristics, such as taking on multiple activities simultaneously and high competitive drive, tend to create stress where none might have existed otherwise. Still others, such as self-imposed deadlines and chronic sense of time urgency, can tend to exacerbate stress to the extent that the individual is hyperresponsive to time cues. Together, these characteristics mark an individual who lives under continual stress and who might profit from the stress-reducing coping skills produced by AMT.

Following this logic, Suinn and his colleagues developed and evaluated the Cardiac Stress Management Program (CSMP). The first phase of CSMP involved the use of AMT for the self-control of stress. The second phase was designed to develop and substitute alternative behaviors for the habitual type A behaviors. Alternative behaviors (e.g., slower pace at walking or other tasks and delegation of tasks to subordinates) were identified and then rehearsed in imagination through visuomotor behavioral rehearsal (Suinn, 1972). The latter procedure has individuals imagine engaging in the new behavior in real life circumstances to maximize transfer to the *in vivo* setting.

The effectiveness of adding CSMP to traditional cardiac rehabilitation was evaluated in a series of clinical studies (Suinn, 1974, 1975b) conducted at the Cardiac Reconditioning Unit of the Spalding Rehabilitation Center in Denver, Colorado. Most of the patients in these studies were males in their 50s who had recently suffered a myocardial infarction. These patients were randomly assigned to experimental CSMP or control groups. Controls completed the usual rehabilitation program consisting of exercise prescription, physiological stress testing, and assistance in dietary and smoking management. The experimental group received the same rehabilitation program but, in addition, completed five sessions of CSMP. The results showed high numbers (83%) of CSMP patients reporting substantial reductions in daily tension level and significant life-style modification, such as delegating more responsibility to employees. The control group showed a slight reduction in serum cholesterol level of 2.6 mg% (from 233.7 pretest to 231.1 posttest), whereas one CSMP group experienced a 15.0 mg% drop (from 229.1 to 214.1), and a second CSMP group used in a replication study showed a 19.1 mg% reduction (from 262.5 to 243.4). Changes in triglycerides were even more substantial. The control group showed a slight rise of 3.2 mg% (from 179.3 to 182.5), whereas the first CSMP group revealed a 42.8 mg% decrease (from 171.6 to 128.8), and the second group a 65.1 mg% decrease (from 270.9 to 205.8). The controls showed a slight (1.2 pound) increase in weight, whereas CSMP groups showed slight (3.0 and 1.4 pound) weight losses. Thus, the CSMP program, which contained a large AMT component, led to significant reductions of both reported stress and lipid levels as assessed by serum cholesterol and triglycerides in a population with documented cardiovascular involvement.

These early studies confounded AMT with other aspects of the

CSMP program and did not contain more direct measures of type A be-havior. In a subsequent study, Suinn and Bloom (1978) evaluated the effects of AMT alone on a population of healthy volunteers who re-sponded to an advertisement describing type A characteristics. The fol-lowing assessments were completed on a pre–post basis: (a) Jenkins Ac-tivity Survey, a measure of type A behavior; (b) the State and Trait Anx-iety Scales of the Spielberger State–Trait Anxiety Inventory; (c) systolic and diastolic blood pressure; and (d) a 24-hour fasting blood sample. Anx-iety management training was conducted in six group sessions over a 3-week period. Significant reductions in both trait and state anxieties and in the speed–impatience and hard-driving subscales of the Jenkins Activ-ity Survey were found for the AMT group compared to the waiting-list control. Although not statistically significant, the blood pressure data were promising; 86% of AMT subjects revealed reductions in systolic blood pressure (mean reductions of 14 mmHg), and 71% evidenced reduc-tions in diastolic pressure (mean reduction of 2.5 mmHg). Changes in lipid levels were not significant. Though these findings await replication in populations with known cardiovascular involvement, AMT appeared to make substantial reductions in both stress level and significant por-tions of the type A behavior pattern. In a preventive way, this might help break up some of the associations among stress, type A behavior, and coro-nary artery disease.

These research findings suggest that AMT not only reduces chronic stress but also can play a significant role in altering other factors that are negatively related to health. For example, there was promising evidence that AMT could significantly reduce elevated blood pressure, an effect that might be strengthened if particular attention were paid to training the patient to become aware of the internal cues that covary with a rise in blood pressure (Johnson, 1978). Such effects on blood pressure could be particularly important when medication is contraindicated. Anxiety management training was also effective in reducing stress reactions, lipid levels, and type A behavior patterns, suggesting that it could play an important role in both preventive and remedial programs designed to reduce risk factors contributing to cardiovascular disorders. Although AMT has been applied to just a few stress–disease relationships, these findings suggest that it can be easily adapted to a large number of disease processes that are known to bear significant relationship to stress—for example, tension and migraine headaches, dysmenorrhea, insomnia, and asthma, to name just a few. Additionally, AMT could be adapted to other psychological states of high arousal, such as anger and agitation, that significantly influence disease processes directly or interfere with treat-ment processes. In either case, patients would be trained to become aware of the internal cues that covary with rise of the problem condition and to apply self-controlled relaxation to these cues. Though AMT is not offered as a panacea, the research findings suggest it to be a valuable, flexible,

short-term technique with which to modify stress factors that, in turn, are significantly related to the development, maintenance, and treatment of disease.

GENERAL PRINCIPLES IN THE TREATMENT OF THE CHRONICALLY ANXIOUS

As with any patient population, the chronically anxious pose unique problems for treatment. The remainder of this chapter outlines several general therapeutic principles designed to facilitate the treatment of chronically anxious patients. The application of these principles in AMT is described to provide concrete examples of their use. The applicability of these principles, however, is thought to be general; their incorporation into other behavioral medicine approaches to the chronically anxious should reduce therapeutic impasses and improve overall treatment efficiency.

Positive, Realistic Therapeutic Orientation

Patients are encouraged to see stress as a significant factor in their illness. Often, a brief reference is made to research demonstrating the stress–illness relationship. However, the focus is quickly shifted to a positive aspect—the patient's ability to learn to manage stress and to break up the stress–illness relationship. Anxiety management training is described as a short-term, highly effective method for learning such coping skills. The patient's capacity for stress control is emphasized, and active patient involvement and practice is underscored. Patients are told that their situations can and will improve only to the extent that they practice and apply the skills they will be learning. Thus, from the start patients are given a positive therapeutic set, one, however, that is realistically contingent on their active participation.

Some patients can be characterized by a need for instant results and, hence, can become discouraged by the lack of dramatic improvement. They are told that progress is gradual, particularly in the beginning. When such cautions prove insufficient, we have found several strategies to be clinically useful. (a) During relaxation practice at home, patients rate their tension level (0–100 scale) both prior to and after practice. Significant pre–post reduction can be noted as a sign of progress. (b) During the day, patients self-monitor incidents of tension, rate the experienced anxiety (0–100), and record any physiological cues associated with the anxiety, such as tension headache, upset stomach, stiff neck. Review of the frequency and intensity of anxiety arousal data often reveals tangible improvement that might have been unnoticed by the patient. Reduction

of significant tension states provides additional evidence of progress. (c) Patients might be asked to rate how they did respond or would have responded prior to therapy to some current stressor. Comparison of pre-therapy and current reactions often reveals an increment of coping capacity. (d) In some cases, it can be necessary to explore patient definition of "successful coping." Patients might expect that they must handle every situation with complete calm and perfect competence and demeanor. Direct discussion and explanation of the unreasonable, impractical nature of such expectations tends to reduce their impact.

Coping Orientation

Patients are encouraged to view stress as a normal part of everyday living. The distinction between "elegant" and "practical" solutions to stress reduction often proves helpful. The elegant solution to the patient's problems would be to rearrange the personal-social-physical world such that it never again stressed the individual. The impossibility of this is explored, and the practical solution of learning stress-reducing coping skills is emphasized. Anxiety management training is described as a procedure through which the patient learns the cues of the onset of tension and how to self-initiate relaxation to reduce arousal before it becomes high and debilitative. That is, patients are given a set that stresses their capacity to recognize and cope with stress rather than being a victim of it or expecting some instant, effortless cure.

Given the general coping orientation, therapists should be alert to the possibility that patients might conceptualize events in a way that is counterproductive to the coping orientation. One common problem is that some chronically anxious patients interpret relaxation practice as a direct means of alleviating anxiety. They do not practice relaxation at home, stating that they were not anxious and therefore had no need to practice. If this happens, it is important to reiterate that the goal of relaxation homework is to learn a skill, not to reduce anxiety directly. The relaxation response must be built before it can be adopted for *in vivo* application as a coping skill. Analogies of the stepwise learning in other complex skills, such as driving a car or playing golf, are useful in clarifying this general point. It is useful to indicate that everyone will face environmental situations that set off stress in ordinary active living. Relaxation is learned as the first step toward developing a new response. The second step is learning how to apply the respone. It is similar to reading a driver's manual and driving on a protected road versus driving on a crowded freeway on ice. Pointing out the overall inefficiency of the full progressive relaxation procedures can prove helpful, as the patient sees he or she will not always have the time to go through the whole procedure for tension control. However, should this problem persist, patients might be asked to practice relaxation a given number of times, say five, before the next appointment is scheduled.

Success Orientation

The coping resources of the chronically anxious are often minimal. They often have greater difficulty in handling failures and setbacks than other patients. Thus, with this population it is very important to make every effort to minimize failure and guarantee success. This can be done most readily by making therapeutic steps small and by moving patients to the next more difficult step only when they have mastered the previous step and probabilities are high that they can master it. For example, in AMT proper the therapist maintains control over the exposure of anxiety arousal. Only when patients have demonstrated the capacity to reduce anxiety under therapist control is the control shifted gradually to the patient. The same principle applies to self-monitoring homework, which begins with patients recording three times a day (morning, afternoon, and night) (a) their emotional state, (b) the precipitating event, and (c) the time of day. Over succeeding sessions, patients learn to record the intensity of their affective state (0–100 scale) and specific physiological cues that covary with the experience of anxiety. Making assignments as simple as possible in the beginning maximizes changes that patients will, in fact, complete them. Other components of complexities are added only when patients have successfully completed the earlier, less demanding tasks.

Nonconfrontive Orientation

Many chronically anxious patients interpret and describe the symptoms of stress reactions as physiological aspects of their illnesses. For them, the symptoms of anxiety are just further evidence of their poor physical health. They tend to be very resistant to psychological explanations—many have already been told that "it is all in your head." The symptoms and stress reactions should be accepted as very real and painful. Regardless of contributing sources, the symptoms are disturbing and debilitative to the patient. The therapeutic emphasis is rapidly shifted to the control and management of these aversive reactions, regardless of their source, rather than to confront the physiological explanation of the patient. The patient's capacity managing these problems is emphasized and efforts are made to move rapidly toward the development of coping skills. This approach tends to minimize unproductive discussion of the relative merits of patient and therapist explanatory systems and to maximize immediate patient involvement in the therapeutic process. In a practical sense, the way the symptoms are explained is unimportant if the patient can reduce their presence and not be bothered by them.

Nonblaming Orientation

Patients are not blamed or held responsible for their chronic anxiety patterns. Every effort is made to enable patients to avoid seeing anxiety as

some sort of personal inadequacy or personality defect. This helps prevent tendencies of patients to create additional stress through personal devaluation and viewing themselves as incapable of dealing with the situations through self-control. Instead, anxiety is described as an over-responsiveness to stressors or a hypersensitivity to them. It is stressed that anxiety is a natural, learned response stemming from an unfortunate learning history, and it is suggested that any individual exposed to their backgrounds would have developed anxiety reactions. The emphasis on the learning of anxiety decreases personal blaming and paves the way for the notion that anxiety can be unlearned or that alternative behaviors can be learned in its place. The direction of therapy then shifts to the development of self-managed coping skills for stress control.

Maintenance Orientation

Many patients develop effective coping skills but 6 months later experience considerable stress because they fail to use these skills. Alerting patients to this problem is helpful. Practice and use of coping skills is described as a lifelong process. Because life will continue to provide stress, they must continue applying the skills to combat the stress. Continued practice makes coping easier but not unnecessary. Patients can come to control their reactions to the world. This orientation toward maintenance and self-control aspects of AMT seems to facilitate greater transfer and maintenance of coping skills (Deffenbacher and Shelton, 1978). These effects can be buttressed by strategies such as (a) lengthening time between later sessions, for example, every 2–3 weeks; (b) periodic follow-up or booster sessions, for example, every 10–12 weeks; (c) continued self-monitoring reported to the therapist by phone or mail; and (d) self-reinforcement schedules of coping. Each of these strategies keeps patients focused on continual efforts to cope when stress is low and skills tend to be unused.

Combined Treatment Orientation

Although AMT is an effective stress management intervention, it is directed primarily at the development of skills for the reduction of heightened autonomic arousal. Patients still might not possess the necessary cognitive or behavioral skills with which to handle various stresses. In such cases, AMT should be combined with other effective cognitive-behavioral skill-building programs such as assertion training for interpersonal stress or communication training for distressed couples. Combining AMT with visuomotor behavioral rehearsal of type B behavior patterns for cardiac patients (Suinn, 1975b) is an example of effective treatment combinations.

Anxiety management training can also be combined with medical regimens in the treatment of various diseases. The use of AMT with car-

diac patients described earlier exemplifies such combined psychological-medical approaches. It is not uncommon for chronically anxious patients to be taking fairly large doses of minor tranquilizers such as Valium or Librium. The following general guidelines are appropriate in dealing with such patients. (a) Do not remove tranquilizers as a precondition for therapy. To do so can remove one of the few coping devices the patient has. (b) Delay the reduction of medication until after the individual has demonstrated the capacity to employ the new coping skills successfully. Then it is suggested that medication be withdrawn in gradual steps so that the patient's sense of coping is not outstripped. Additionally, for some patients reduction of medication, rather than complete removal of medication, might be an appropriate therapeutic goal. (c) The reduction of medication should be under close medical supervision in order to monitor and remediate possible withdrawal reactions for chemical dependency.

Preventive Orientation

The bulk of this chapter has focused on the remedial treatment of chronically anxious adults. However, one of the best means of treatment for this population could be prevention. Efforts should be directed toward the identification of precursors to adult anxiety in high-risk populations. Treatment at an early age might significantly reduce the probability of adult problems. An example of such an effort has been the successful reduction of test anxiety in elementary school students (Deffenbacher & Kemper, 1974). For example, AMT might be adopted as a counseling intervention for anxious youngsters or as a portion of the general curriculum as part of gaining life coping skills.

REFERENCES

Berghausen, P. E. *Anxiety management training: Need for arousal-cued relaxation.* Unpublished doctoral dissertation, Colorado State University, 1977.

Bloom, L. J., & Cantrell, D. Anxiety management training for essential hypertension in pregnancy. *Behavior Therapy*, 1978, *9*, 377–382.

Deffenbacher, J. L., & Kemper, C. C. Counseling test-anxious sixth graders. *Elementary School Guidance and Counseling*, 1974, *9*, 22–29.

Deffenbacher, J. L., & Shelton, J. L. A comparison of anxiety management training and desensitization in reducing test and other anxieties. *Journal of Counseling Psychology*, 1978, *25*, 277–282.

Edie, C. *Uses of anxiety management training in treating trait anxiety.* Unpublished doctoral dissertation, Colorado State University, 1972.

Friedman, M., & Rosenman, R. H. Association of specific overt behavior pattern with blood and cardiovascular findings. *Journal of the American Medical Association*, 1959, *169*, 1286–1296.

Holmes, T. S. *Adaptive behavior and health change.* Unpublished thesis, University of Washington, 1970.

Hutchings, D. F., Denney, D. R., Basgall, J. A., & Houston, B. K. *Anxiety management and applied relaxation in reducing chronic anxiety.* Paper presented to the 86th annual convention of the American Psychological Association, Toronto, 1978.

Jenkins, C. D., Zyzanski, S. J., Ryan, T. J., Flessas, A., & Tannenbaum, S. I. Social insecurity and coronary-prone type A responses as identifiers of severe atherosclerosis. *Journal of Consulting and Clinical Psychology,* 1977, *45,* 1060–1067.

Johnson, K. *Behavioural self-management of essential hypertension in the natural environment—a three month follow-up.* Paper presented at the first Australian conference on Behaviour Modification, Sydney, Australia, 1978.

Lang, P. J. The mechanics of desensitization and the laboratory study of human fear. In C. M. Franks (Ed.), *Behavior therapy: Appraisal and status.* New York: McGraw-Hill, 1969.

Nally, M. *AMT: A treatment for delinquents.* Unpublished doctoral dissertation, Colorado State University, 1975.

Nicoletti, J. *Anxiety management training.* Unpublished doctoral dissertation, Colorado State University, 1972.

Rahe, R. H., & Lind, E. Psychosocial factors and sudden cardiac death: A pilot study. *Journal of Psychosomatic Research,* 1971, *15,* 19–24.

Richardson, F., & Suinn, R. A comparison of traditional systematic desensitization, accelerated massed desensitization, and anxiety management training in the treatment of mathematics anxiety. *Behavior Therapy,* 1973, *4,* 212–218.

Rimm, D. C., & Sommervill, J. W. *Abnormal psychology.* New York: Academic Press, 1977.

Rosenman, R., & Friedman, M. Association of specific behavior pattern in women with blood and cardiovascular findings. *Circulation,* 1961, *23,* 1173.

Selye, H. *The stress of life.* New York: McGraw-Hill, 1956.

Shoemaker, J. *Treatments for anxiety neurosis.* Unpublished doctoral dissertation, Colorado State University, 1976.

Spilken, A. Z., & Jacobs, M. A. Prediction of illness behavior from measures of life crisis, manifest distress and maladaptive coping. *Psychosomatic Medicine,* 1971, *33,* 251–264.

Suinn, R. Removing emotional obstacles to learning and performance by visuo-motor behavior rehearsal. *Behavior Therapy,* 1972, *3,* 308–310.

Suinn, R. M. Behavior therapy for cardiac patients. *Behavior Therapy,* 1974, *5,* 569–571.

Suinn, R. M. Anxiety management training for general anxiety. In R. Suinn & R. Weigel (Eds.), *The innovative therapies: Creative and critical contributions.* New York: Harper & Row, 1975. (a)

Suinn, R. M. The cardiac stress management program for type A patients. *Cardiac Rehabilitation,* 1975, *5*(4), 13–15. (b)

Suinn, R. M. Anxiety management training to control general anxiety. In J. Krumboltz & C. Thoresen (Eds.), *Counseling methods.* New York: Holt, Rinehart & Winston, 1976.

Suinn, R. M. *Manual: Anxiety management training.* Unpublished manuscript, 1977. (a) (Available from Rocky Mountain Behavioral Science Institute, P.O. Box 1066, Fort Collins, Colo. 80522.

Suinn, R. M. Treatment of phobias. In G. Harris (Ed.), *The group treatment of human problems: A social learning approach.* New York: Grune & Stratton, 1977. (b)

Suinn, R. M., & Bloom, L. J. Anxiety management training for pattern A behavior. *Journal of Behavioral Medicine,* 1978, *1,* 25–35.

Suinn, R., & Richardson, F. Anxiety management training: A nonspecific therapy program for anxiety control. *Behavior Therapy,* 1971, *4,* 498–510.

Wolpe, J. *The practice of behavior therapy.* New York: Plenum Press, 1969.

The Mistreating Parent

PATRICIA A. RESICK AND JERRY J. SWEET

INTRODUCTION

The problem of mistreatment of children in the United States has been receiving increasing amounts of attention by health care professionals ever since Kempe, Silverman, Steele, Droegemuller, and Silver (1962) first identified the *battered child syndrome.* This phrase captured the attention of Americans and resulted in massive efforts to discover the causes of child mistreatment and to develop effective intervention and treatment strategies that would ameliorate the problem. As a result, the National Center for the Prevention and Treatment of Child Abuse and Neglect was founded in 1972, and mandatory reporting laws and provisions for initiating protective services (DeFrancis & Lucht, 1974) have been established in every state in the country. In addition, a great amount of research literature has appeared purporting to describe persons who mistreat children and offering wide ranges of possible treatments for these persons. The focus of the present chapter will be on clinical intervention and treatment strategies that might be effective in dealing with mistreating parents. For a discussion of the theoretical formulations of child mistreatment, the reader can refer to the reviews of Sweet and Resick (1979) and Parke and Collmer (1975).

PATRICIA A. RESICK • Department of Psychology, University of Missouri-St. Louis, St. Louis, Missouri 63121.   JERRY J. SWEET • Department of Psychiatry, Illinois Masonic Medical Center, Chicago, Illinois 60657.

Definition of Mistreatment

Reading through the burgeoning literature on child mistreatment makes it apparent that no widely accepted definition of *child abuse* exists. Some definitions are limited to intentional, nonaccidental physical injuries (e.g., Gil, 1970; Steele & Pollock, 1968), whereas others (e.g., Welner, Welner, & Robins, 1977) do not distinguish between accidental and nonaccidental injuries in the belief that intentionality cannot be measured. Giovannoni (1971), among others, has attempted to differentiate between child *abuse* and child *neglect* as conditions that are not necessarily related or coincident (see also, Galdston, 1965; Martin, Beezley, Conway, & Kempe, 1974). Young (1964) has distinguished between moderate and severe abuse and between moderate and severe neglect based on the finding that different parental behaviors and attitudes were associated with each of the types of mistreatment. Still other investigators have noted differences between physical and emotional mistreatment (Costin, 1972; Emery & Howell, 1974; Jayaratne, 1977) or the need for separating sexual abuse and incest from other forms of physical abuse (Brant & Tisza, 1977; Rosenfeld, Nadelson, Krieger, & Backman, 1977; Sgroi, 1975).

Gelles (1976) has stated that it is misleading to expect that different types of mistreatment are derived from the same causes or that they necessarily can be treated or prevented by adoption of uniform intervention programs. As more is learned about the causes of mistreatment, the characteristics of the perpetrators and victims, and the efficacy of the treatments employed, it seems only natural that the definition of mistreatment used in particular studies become more specific. Although a global definition might simplify matters conceptually for the general public as to which parenting behaviors are unacceptable, child mistreatment researchers would gain little by classifying all negatively valued caretaking activities under the rubric of *child abuse*.

It has now been recognized that general questions such as what "really causes abuse" are unanswerable and unproductive (Gelles, 1975). A more fruitful approach to investigating the various phenomena associated with child mistreatment consists of more specific questions such as what conditions lead to different types of mistreatment and what interventions are the most effective in halting these specific types of mistreatment given the conditions present. As long as investigators clearly describe the criteria used in defining particular parenting behaviors, parent–child interactions, consequences to the child, and/or behaviors of the child that they are studying, there should be no difficulty in making interpretations or comparisons across studies.

The search for a general definition of abuse or mistreatment is essential only insofar as it is required to establish appropriate laws for the adequate protection of the rights of both children and parents (Fraser, 1976; Rogers, 1977; Rosenburg, 1975). The fact that a widely accepted

definition of mistreatment does not exist does not preclude our learning
more about the causes and treatments of these phenomena (Gelles, 1976).
Only when definitions and criteria are vague and ambiguous or studies
are compared that have used different criteria do we have problems.

The term *mistreatment* is used here to describe any parenting acts
that result in significant negative emotional or physical consequences for
the child. Thus, the term encompasses physical and emotional abuse,
physical and emotional neglect, and sexual abuse. More specific terms
will be used in those instances where individual studies pertain to a
particular type of parenting behavior.

Defining the population is more difficult than defining behavior. Be-
cause of the stigma involved, mistreating parents typically do not seek
help but are reported to the police or social services. This type of referral
system probably draws a biased sample from the population. There is
undoubtedly greater reluctance to report educated people from the higher
socioeconomic classes. Therefore, the greater representation of lower
socioeconomic classes in the samples studied might or might not be
meaningful (Elmer, 1967; Garbarino, 1976; Gil, 1971). However, in a fac-
tor analytic study, Light (1973) found that father's unemployment was
the variable that showed up most frequently. Following a nationwide
survey, Gil (1970) reported that 48% of the fathers of abused children
were unemployed during the year before the child was assaulted and that
12% were unemployed at the time of the abuse.

The mistreating family can be under stress in other ways as well.
Kempe *et al.* (1962) found a high proportion of divorce, separation, and
unstable marriages among abusing families. Half of the abusive mothers
in one study (Elmer, 1967) reported depression, including crying spells
and eating or sleeping disorders. Gil (1970) found that 7% of mothers and
4% of fathers in abusive families had been hospitalized for mental prob-
lems in the past. He also found that 11% of mothers and 10% of fathers
had experienced medical problems during the year preceding the incident.
Excessive alcohol use has also been reported among abusive and ne-
glectful parents (Young, 1964).

The victim of abuse can also function as a stressor in the family.
Several studies have found that high percentages of mistreated children
were unwanted children, had low birth weights, were mentally retarded,
were handicapped, or had severe behavior problems (Elmer, 1967; Gil,
1970; Tomufod, Sinkford, & Louy, 1975). Apparently the child with
health problems is at higher risk of mistreatment, so those professionals
working in the field of behavioral medicine should be sensitive to this
possibility.

Finally, with regard to the definition of who mistreats children, Gil's
nationwide survey (1970) examined almost 14,000 cases. He found that in
48% of the sample the child was abused by the mother or mother substi-
tute and in 39% by the father or father substitute. In 12% of the cases, the
perpetrator was another relative. However, 30% of the children were

living in fatherless homes. When only homes with fathers present were considered, fathers or father substitutes were involved as perpetrators in almost two-thirds of the homes, and mothers or mother substitutes in just less than half. Of the fathers involved in abuse, a third were not biological fathers but stepfathers.

Incidence

Studies that have been concerned with determining the incidence of child mistreatment (e.g., Cohen & Sussman, 1975; Ebbin, Gollub, Stein, & Wilson, 1969; Gil, 1970; Lauer, Broeck, & Grossman, 1974; Light, 1973; Newberger & Daniel, 1976) have generally reported widely varying figures. For example, the number of actual physical child abuse cases reported has jumped from about 6,000 in 1967 (Gil, 1970) to over 200,000 in 1974 (Newberger & Daniel, 1976). Estimates of the actual incidence of physical child abuse cases annually have ranged from 60,000 to 4.07 million (Cohen & Sussman, 1975). Light (1973) has suggested that the great disparity in incidence figures could be due to (a) enormous variation of incidence from state to state that results in grossly inaccurate national estimates, (b) invalid reporting rates within states, and (c) the unwillingness of physicians to report cases of abuse and neglect. Additionally, the low reliability of the figures is probably due to the use of inconsistent definitions of the problem across researchers, different statistical estimation procedures, and different sources of data.

As Newberger and Daniel (1976) have noted, the fact that estimates of the incidence of mistreatment have increased in recent years does not necessarily mean that this problem is akin to a disease that is spreading and growing out of control in epidemic fashion. The statistical illusion of rapidly increasing incidence figures is probably also due to changing reporting laws and practices as well as an increased awareness on the part of the public and professionals alike of the indications of mistreatment.

We can only conclude, as have Cohen and Sussman (1975), that the true incidence of child mistreatment in the United States is not known. However, examination of available estimates on physical child abuse alone, such as those cited previously, suggests that when one considers all types of child mistreatment, the existing problem takes on ominous proportions. Clearly, the current estimates are undeniable evidence of our need to develop effective intervention and treatment programs for abusive and neglectful parents.

PSYCHODYNAMIC FORMULATIONS AND TREATMENTS

Until very recently, the field of child abuse has been dominated by psychoanalytic theory and intervention. Psychodynamic formulations of

child mistreatment are perhaps best exemplified by the belief frequently cited in the literature that abusive parents have a "defect in character structure which allows aggressive impulses to be expressed too freely" (Kempe et al., 1962, p. 18). In this approach, the intrapsychic forces that are believed to be determining an individual's behavior are often described in terms of psychopathological personality traits and states that are either measured through psychological tests or inferred by the particular professional involved.

Typical of this approach is the study in which Green, Gaines, and Sandgrund (1974) interviewed mothers or maternal caretakers of 60 physically abused children and found six personality characteristics common to most: (1) reliance on the child to satisfy dependency needs not fulfilled in relationships with spouse and family; (2) impaired impulse control; (3) poor self-concept; (4) disturbances in identity formation; (5) frequent use of projection and externalization to defend against awareness of underlying feelings of worthlessness; and (6) misperception of the child. From their analysis, Green et al. provide the following as a characteristic psychoanalytic interpretation of maternal child abuse: The child places an increased demand for nurturance on the mother, which intensifies her own unsatisfied dependency feelings. Unable to receive gratification from her spouse, she turns to the child for satisfaction of these needs and is frustrated. The mother then unconsciously equates the child with her own critical, rejecting mother and again experiences the humiliation and rejection of her childhood. The resulting anxiety, guilt, and loss of self-esteem become intolerable and are displaced onto the child by such defense mechanisms as denial, projection, and externalization. The mother identifies with her mother, who represents her punitive superego, and attacks her child, who is now a symbol of both her past and present inadequacies.

Psychological treatments that are psychodynamic in nature focus on intrapsychic sources of conflict thought to be the underlying cause of the mistreatment incidents. Psychodynamic techniques attempt to gain resolution in the form of insight into and "working through" problematic childhood experiences that unconsciously motivate the parent to attack his or her child (Blumberg, 1977; Galdston, 1971). Blumberg (1977) has stated that psychotherapy for the mistreating parent should be directed toward improving the parent's self-image and ego strength, allowing for an abreaction of childhood experiences. He believes that by combining this type of psychotherapy with "mothering" and parental education in child rearing, treatment can be successful in 50–80% of the cases. Flynn (1970) has stated that psychodynamically oriented therapy is very effective in reducing dependence on defence mechanisms that allow mistreatment to occur.

Some instances of group therapy with mistreating parents have also been reported. For example, group therapy has been used to provide "parent surrogates" for the parents (Paulson & Chaleff, 1973; Paulson, Savino,

Chaleff, Sanders, Frisch, & Dunn, 1974), to examine interaction patterns between parents and their children (Justice & Justice, 1975), and as a vehicle for personal growth and educational instruction (Savino & Sanders, 1973). In addition, supportive group therapy has been used with parents "at risk" of mistreating their children (Ounsted, Oppenheimer, & Lindsay, 1974).

A major problem with individual psychodynamic therapy and group process approaches is the type of criterion used to evaluate treatment effectiveness. Often these approaches focus on the behavior within the group or within the therapy session as the sole criterion of improvement, effectively divorcing themselves from the initial criteria (i.e., signs of mistreatment) that led to the intervention. As an example, David (1974) considered his confrontation technique a success because his client began to take better care of her appearance while at the same time acknowledging that he had no actual evidence that physical abuse had stopped. Clearly, more appropriate measures should be used to evaluate the effectiveness of child mistreatment interventions, especially in light of the major objective cited earlier—to protect the physical health and emotional well-being of the child.

Group process and psychodynamic approaches appear to be capable of providing emotional support that can relieve guilt and allow mistreating parents to feel or think more positively about themselves. Although in some cases these approaches have led to lowered incidents of mistreatment (Justice & Justice, 1975), most statements claiming effectiveness of psychodynamically oriented interventions appear to be based on opinions, not data (Blumberg, 1977; Flynn, 1970). As of yet, there is no empirical evidence concerning therapy outcome to justify the use of these methods as complete intervention strategies. For the present, their use should be confined to that of an ancillary treatment and perhaps only for the purpose of providing emotional support.

SOCIAL WORK APPROACHES

The therapeutic orientation of social work is predominantly psychodynamic, with a focus on developing a supportive relationship with the parents and their attainment of insight (e.g., Boisvert, 1972; Costin, 1972; Zalba, 1967). Unfortunately, the details of intervention techniques in the social work literature are frequently left unspecified and are described by such vague terms as aggressive casework, supportive casework, relationship-based casework, ego-supportive surveillance, group therapy, psychoanalytically oriented psychotherapy, authority-based control, and reality-based planning (Boisvert, 1972; Zalba, 1967).

The role of the social worker in child mistreatment intervention has been extensive and is therefore difficult to describe briefly. The social work mode of intervention is one of organizing and of social activism as

evidenced in the recent child advocacy movement (Davidson & Rapp, 1976; Kahn, Kamerman, & McGowan, 1973). Typically, social work is involved with mistreatment through hospitals and protective service agencies. Their intervention activities range from the initiation of legal intervention to individual psychotherapy. If no multidisciplinary child protection team is available in a community, the social worker must pool available resources and match delivery of services to individual cases as deemed necessary. Usually a number of social services are coordinated by social workers, such as emergency nurseries and homemakers who assist and teach household management (Shames, 1970). Schmitt, Grosz, and Carroll (1976) suggest that for adequate care two social workers, one in the hospital and one in the community, are needed to provide (a) evaluation of safety of the home, (b) intervention with and support of parents, (c) initiation of legal action, and (d) initiation of ongoing treatment services to the family. The contradictory roles of being both the child's and parents' advocates make intervention by one social worker very difficult.

The lack of operational definitions and program evaluation in this aspect of child mistreatment intervention prevents accurate assessment of the efficacy of various components of social work interventions. As such, it is not possible to evaluate or make recommendations concerning the best use of such resources. Given the fact that protective service workers are overburdened, a valuable topic for research would be to determine the most effective social services for reducing the incidence of mistreatment and to operationalize and compare the various styles of intervention by social workers.

SOCIAL LEARNING THEORIES AND INTERVENTIONS

Theory

The main premise of social learning theory is that behavior is accounted for by the continuous reciprocal interaction of people and their environmental determinants (Bandura, 1977). People have problems when behavior they have learned brings them into conflict with themselves and others. Even then, it is the deviant behavior that is considered to be the problem rather than the person's personality. Instead of traditional labeling and use of terms implying disease and pathology, problems are discussed and conceptualized in terms of behavior excesses, skill deficits, maladaptive responses, inappropriate or unrealistic goals or expectations, and failure to make discriminations.

Until very recently, learning theory has not been advanced formally to explain child abuse. However, the work of Bandura on aggression appears to be directly applicable. Based on a series of studies, Bandura (1973) has proposed that aggressive behavior is acquired readily through observation of aggressive models. Seeing individuals behaving aggressively

without adverse consequences reduces restraints in observers. Such observation increases both the frequency of aggressive behavior and the harshness of interactions. Once aggressive behavior has been learned, it can be maintained by positive or negative reinforcement.

A number of studies have provided evidence that parents who abuse their children were, themselves, abused in childhood (Zalba, 1967) and/or had violent adult models (Green *et al.*, 1974). Oliver and Taylor (1971) reported finding a family in which five generations of children had been mistreated. Silver, Dublin, and Lourie (1969) studied 34 cases of child abuse and found evidence of abuse covering three generations. They concluded that violence breeds violence. Not all abusive parents were abused children, however. Flynn (1970) described two cases in which young mothers who physically abused their children had no history of having been physically mistreated as children. Similarly, although Steele and Pollock (1968) stated that, without exception, all of the 60 abusive parents they studied had, as children, been under intense, continuous demand from their parents, most of them had not actually experienced physical beatings.

Jayaratne (1977) recently examined some of the evidence for and against the "generational hypothesis" of child mistreatment and concluded that the primary causal factor in mistreatment might be emotional stress rather than physical abuse in childhood. He cited expectation bias, poor methodology, and definitional confusion as reasons for lack of good supporting evidence for the hypothesis. He went on to state, "There is little doubt that experimental and observational learning play a significant role in parenting practices, but the available data on the generational hypothesis do not stand the test of empiricism" (p. 8).

The research methodology allied with social learning theory is one in which explanations of events are sought predominantly through investigation of observable behaviors. Little empirical evidence concerning behavioral characteristics of mistreating parents has been gathered to date (Jayaratne, 1977). The available evidence does suggest that there are discriminable differences in parenting behaviors between mistreating parents and nonmistreating parents.

Recently, in a series of studies, interaction styles of abusive, neglectful, and normal families were observed in the home (Anderson & Burgess, 1977; Burgess & Conger, 1977; Kimball & Burgess, 1977). Trained observers were uninformed about to which group each family belonged. The researchers found that mothers in abusive families interacted 27% less, emitted positive behaviors at a 40% lower rate, and emitted negative behavior 67% more than control mothers did. Neglect mothers interacted at the same rate but exhibited half the rate of positive and three times the rate of negative behavior as controls. Fathers in abusive families did not differ from controls, but neglect fathers interacted less and were more negative than controls.

In an attempt to examine the modeling hypothesis, Anderson and Burgess (1977) observed the behavior of parents and children in abusive and nonabusive families. They found that children reciprocated their parents' behavior. In abusive families, sons were especially likely to reciprocate their parents' negative behavior, and sons received less positive behavior from their parents. Negative interaction among siblings occurred 50% more often in abusive families as well.

In perhaps the most comprehensive behavioral analysis of physically abusive families, Reid, Taplin and Lorber (1981) observed and recorded social interactions of family members in terms of 29 categories of behavior. Abusive mothers exhibited significantly more aversive behaviors than either nondistressed or distressed, nonabusive mothers. The differences were not significant for fathers. In addition, there was a nearly equal chance that abusive mothers would respond with positive behaviors following prosocial behavior as following disruptive behaviors by the child. Thus, abusive mothers appear not only to behave more aversively but also to be inconsistent in their behavior in reaction to the child.

Gray, Cutler, Dean, and Kempe (1977) have found information obtained by nurses and physicians from behavioral observations of parents and newborns in the labor and delivery rooms of a hospital to be useful in predicting the mistreatment potential of parents. With this information, 76.5% of the parents were correctly classified as either high or low abuse risks. It should be noted that, unlike the Reid, Taplin, and Lorber (1981) study mentioned above, Gray *et al.* attained a high level of predictive success employing general, rather than specific, behavioral descriptions of the parents.

Young (1964) examined case records of 180 families to try to identify behavioral differences between types of mistreating persons. She reported differences between abusive and neglectful parents in amounts of physical abuse, use of abusive language, restrictions placed on children, resistance to outside intervention, and style of reacting to family crises. However, these findings are not the result of controlled data collection and are vulnerable to a number of biases characteristic of such records. Replication is needed before they can be considered established.

A behavioral model of child abuse has been proposed by Feindler (1978). The purpose behind such a model is to propose variables operating in the abuse situation to enable researchers and clinicians to analyze and then modify the stimulus control of this type of aggression. The model is derived from Bandura's work on aggression. Feindler proposes that there are three types of antecedent conditions. The first are long-term individual determinants that are behavioral excesses and deficits in the abusing parent's repertoire. Excesses that might be present are anxiety, exceedingly high expectations of child behavior, fear of negative feedback, and excessive negative communication skills. Deficits might include a

lack of self-control over aggressive behavior, few problem-solving or cop-
ing skills, and lack of information and skills concerning child develop-
ment and management.

Intermediate antecedents comprise the second type and are the en-
vironmental conditions that contribute to situational stress. These de-
terminants can include marital difficulties, financial problems, social iso-
lation, crowded or inadequate living arrangements, health problems, and
so forth. Environmental stresses can vary greatly and are viewed by Feind-
ler as intervening, but not necessary, conditions for abuse.

The final category of antecedents are the immediate precipitators,
which Feindler labels social determinants. These are the child's behaviors
that are aversive to the parent. Such behavior would include temper tan-
trums, hyperactivity, noncompliance, developmental problems requiring
increased attention, health problems, or failure to respond socially to the
parent.

Feindler has proposed several consequences to both abusing parents
and the mistreated child. The cessation of the child's aversive behavior
can negatively reinforce the parent. Positive reinforcement can occur
cognitively by the parent's self-statements concerning being a good, strict
parent. Although the parent can also feel guilt, this might not be as potent
as the positive and negative reinforcers. The consequences for the child
are not apparent immediately except for the physical injury involved.
Long-term consequences can include neurological, cognitive, or motor
impairment, increased pain tolerance, hyperalertness to anger cues, and
the development of maladaptive behavior such as withdrawal or aggres-
sion.

In summary, social learning theory proposes that child mistreatment
is a learned pattern of interaction. There is evidence that at least some
abusing parents might have learned such patterns within their own
families through reinforcement and modeling. Behavior therapy appears
to be a promising approach for remediation. Because the negative parent-
ing behaviors involved in child mistreatment are regarded as learned be-
haviors that are maintained by situational and cognitive factors, parent
skills training and various other behavioral procedures should be consid-
ered in treatment planning. In addition, the main social learning
methodology—behavioral observation—holds promise for obtaining
sound information on the behavioral excesses and deficits of abusive
parents and their children. It might be possible to use a behavioral
methodology to learn how the interactions of parents and children lead to
violent outcomes.

Interventions

Behavioral intervention strategies are those based on principles of
learning that have been demonstrated experimentally to be effective
(Stolz, Wienckowski, & Brown, 1975). Various appropriate behavioral

techniques have been elaborated in great detail in earlier chapters. The types of behavioral procedures that appear to be most relevant to child mistreatment are parent training in child management techniques, anger control, social skills training, and cognitive restructuring (see Chapters 2, 3, and 6).

Parent Training

Because mistreating parents are often viewed as having fewer effective parenting skills than nonmistreating parents (Reid, Taplin, & Lorber, 1981; Tracy & Clark, 1974), parent training in child development and management techniques appears to be an appropriate intervention. However, these techniques might be more suited for abusive than neglectful parents. There appears to be no difference in methods of discipline between adequate, potentially neglectful, and neglectful mothers (Giovannoni & Billingsley, 1970). Several successful applications of behavioral parent training in individual cases of abuse have been reported recently (Bordin-Sandler, 1976; Denicola & Sandler, 1978; Gilbert, 1976; Hughes, 1974; Jensen, 1976).

Parent training has been well researched in the behavioral literature (Forehand, Roberts, Doleys, Hobbs, & Resick, 1976; Jason, 1977; Karoly & Rosenthal, 1977; Kent & O'Leary, 1976; O'Dell, 1974; Patterson, 1974a,b; Patterson, Cobb, & Ray, 1973; Peed, Roberts, & Forehand, 1977). The training typically consists of teaching parents the consistent use of child management techniques based on learning principles. Parents are taught the use of positive reinforcement including social reinforcers to increase desired behaviors. Inappropriate behavior is decreased through extinction or differential reinforcement of other behavior. Time-out, reprimands, and response cost are preferred over physical punishment as methods of discipline. Parents are taught to use these procedures by the therapist through modeling and behavioral rehearsal. Several parenting books are available and are used frequently in conjunction with parent-training programs (Becker, 1971; Patterson & Gullion, 1968).

Originally, parent-training programs were developed to deal with deviant child behavior such as oppositional behavior, noncompliance, and aggression. Parents were trained in behavioral techniques because they were available in the natural environment and controlled many of the child's reinforcers. In the process of studying parent training as a means of modifying the child's behavior, it was observed that the parents of "clinic children" behaved differently than the parents of nonclinic children (Forehand, King, Peed, & Yoder, 1975) and that parents might be inadvertently reinforcing the child's inappropriate behavior (Wahler, 1976). Therefore, parent-training programs now examine changes in both the parents' and the child's behavior as a result of treatment (Forehand & King, 1977; Koegel, Glahn, & Nieminen, 1978; Peed et al., 1977). The use of parent-training procedures for child mistreatment becomes evident

with this shift in focus from the child as therapy target to modification of the parent–child interaction. Because both the parents and the children can exhibit disordered behavior in the mistreatment situation, parent training might prove to be an effective means of altering this destructive interactive pattern.

Tracy and Clark (1974) reported one of the first applications of social learning principles to deal with mistreating parents. These investigators first conducted a behavioral analysis of the parents' child management techniques. Based on this assessment, positive reinforcement and modeling were used to teach parents socially appropriate methods of interacting with their children. Ratings of behavior change measures obtained from direct home observations, number of pediatric clinic visits, and verbal reports of parents and others demonstrated that 84% of 41 families were rated very improved or improved, 9% not improved or worse, and 7% unknown (Tracy, Ballard, & Clark, 1975).

Since this initial study, several other investigators have taken a similar approach to child mistreatment intervention. Hughes (1974) reported a case in which physical child abuse was halted by monetarily rewarding the learning of adaptive, noninjurious methods of child management. Polakow and Peabody (1975) used contingency contracting, discrimination training, and assertion training to extinguish a child's acting-out, which led to physical abuse, and to increase the mother's ability to positively reinforce and nonviolently discipline the child. At the end of 18 months, all progress by mother and child had been maintained.

Reid, Taplin, and Lorber(1981) used a parent-training approach with 27 physically abusive families and were able to reduce significantly the aversive behavior of the mothers and children. The fathers in these families did not show a reduction, apparently because they were already similar to nonabusive fathers. The program involved instructing parents in both social learning theory and its applications to child management. A complete description of procedures and materials is available in Patterson, Reid, Jones, and Conger (1975). Of particular interest here are the alternatives selected to circumvent both the ethical problem of using a no-treatment control group and the methodological problem of generalization of training. The design of the study involved repeated observations of all family members during the preintervention baseline period, during intervention, and during a follow-up period. All observations were made in the home. Thus, the families served as their own control group, and the use of home observations provided the most relevant measure possible for treatment generalization.

Denicola and Sandler (1978) also used the Patterson Coding System to measure changes in parents and children in an experimental single-case approach with two families. The study examined the effects of parent training and a cognitive coping skills procedure. Parent training included didactic instruction, modeling, and behavioral rehearsal in order to teach parents to use behavioral techniques with their children. Coping

skills training included relaxation, stress inoculation, and problem solving to reduce aggressive impulses. Results of the study revealed that parents engaged in less aversive and more prosocial behavior following treatment and at three 1-month follow-up sessions. The children also exhibited fewer aversive and more prosocial responses following treatment.

Although parent training has not been used extensively thus far to treat mistreating parents, particularly neglectful parents, initial efforts suggest that this approach holds much promise. More research will be needed to determine how standardized parenting programs will need to be modified to adapt to the special needs of mistreating parents. The most effective components of newly derived programs will need to be determined as well as generalization across subpopulations of mistreating parents.

Anger Control

Child mistreatment, especially physical abuse, can occur out of desperate attempts by parents to control difficult child behavior (Friedrich & Boriskin, 1976; Polakow & Peabody, 1975). It has been suggested that 63% of physical child abuse is related to acts of parental discipline (Gil, 1970). Further, it has been suggested that aversive interactions between family members can lead to family violence and child abuse (Parke & Collmer, 1975). When these findings are considered with those describing mistreating parents as being under environmental stress (e.g., Garbarino, 1976), a picture emerges of physical abuse occurring due to failure to control anger.

Of particular interest to those working in the field of behavioral medicine is the occurrence of mistreatment by parents with physiological or psychophysiological disorders. Although there are no reports in the literature of research examining the relationship between abuse and pain, there is reason to suspect that such a relationship could exist. In animal research, Ulrich and Azrin (1962; see also Azrin, Hutchinson, & Sallery, 1964) have found that pain can elicit aggressive behavior. It has been suggested for humans that if pain, particularly cutaneous pain, is experienced chronically it might well cause chronic irritability and hostile arousal (Mersky, 1978).

In one of the earliest attempts to develop a typology of abusing parents, Merrill (1962) found four distinct clusters of traits and circumstances. One of the groups consisted of a significant number of abusing fathers. This group was largely young and intelligent, but the fathers were unable to work because of some acquired physical disability. They now stayed at home with the children while their wives worked. They were described as engaging in swift and severe punishment and angry rigid discipline. Though such abuse could result from frustrating circumstances, it is also possible that pain played a role. Professionals working

in the field of behavioral medicine should not overlook the possibility of angry aggression resulting from chronic pain or the frustration of physical disability.

A topic that has been receiving attention recently is training in self-control (Bandura, 1977; Mahoney & Thoresen, 1974; Thoresen & Mahoney, 1974; Watson & Tharp, 1972). A self-control paradigm teaches clients to manage their environments more effectively. Essentially, clients are taught to control their own behaviors by providing them with (a) self-observational skills, (b) the knowledge to arrange self- and external reinforcers and punishers contingent on desired behavior, and (c) coping skills (e.g., muscle relaxation, positive self-statements).

Recently, Novaco (1975, 1976a,b, 1977a,b) has attempted to use a cognitively oriented therapy (stress inoculation) to control anger. The procedure, developed by Meichenbaum and Cameron (1972), has been used with several stress-related problems involving anxiety, anger, and pain (Meichenbaum & Turk, 1976). Stress inoculation has also been suggested for use with child abusers who cannot control their anger (Meichenbaum, 1977). As applied to the problems of anger, Novaco (1975) used stress inoculation to train 34 volunteers with problems controlling anger to resist angry responses to provocation. First, the clients were told that anger reactions consisted of a series of states of cognitive processes and arousal. Then they learned muscle relaxation exercises and adaptive self-statements for each stage—preparing for provocation, impact and confrontation, coping with arousal, and reflecting on outcome. Finally, the clients rehearsed coping with provocation by imagining provoking situations that were hierarchically ordered from least to most provoking. The results of the study indicated that the training program was effective in reducing self-report and physiological indices of anger.

As mentioned earlier, Denicola and Sandler (1978) used a two-variable withdrawal design to study the independent and combined effects of parent training and coping skills training that included stress inoculation. Because each order of presentation was applied to only one family, the results are somewhat equivocal. The presentation of each component appeared to have some effect alone, but greater efficacy was achieved by combining the procedures. However, comparative group research and replication will be needed before any confident statements can be made. The approach is conceptually logical, and single-case designs such as that of Denicola and Sandler are supportive.

Assertive and Social Skills Training

Assertive training has also been used to treat aggressive and explosive behavior (Eisler, Hersen, & Miller, 1974; Foy, Eisler, & Pinkston, 1975; Frederiksen, Jenkins, Foy, & Eisler, 1976; Wallace, Tiegen, Liberman, & Baker, 1973). Assertive training employs the techniques of behavioral rehearsal, a hierarchy of difficult situations, and modeling and

feedback (Rimm & Masters, 1974) to teach clients more appropriate interpersonal skills. Polakow and Peabody (1975) have successfully used assertive training in conjunction with parent training to treat a physically abusive mother. In these studies, assertiveness is viewed as an appropriate set of social skills that aggressive and explosive people might lack.

Frederiksen and Eisler (1977; see also Frederiksen & Rainwater, 1979; Frederiksen et al., 1976) have developed a conceptual model of explosive behavior from their work with aggressive males. Their results suggest that explosive clients are extremely deficient in social skills. Rather than asserting their preferences in mild situations, they either walk away or overreact. They also appear to be very idiosyncratic in their response patterns and frequently react explosively only to a very narrow range of people (target specificity). The treatment they propose is skills training for more appropriate assertion responses. It is not known whether the research on explosive males is directly applicable to the more specific problem of child abuse. However, the pattern of target specificity is reminiscent of many abusing parents who abuse one child but not the other children in the family. The application of assertion skills training holds some promise and bears investigation.

Another potential use of social skills training with mistreating parents is in regard to social isolation. There is evidence that mistreating parents have fewer social contacts than nonmistreating parents (Ackley, 1977; Giovannoni & Billingsley, 1970; Merrill, 1962). In fact, Young (1964) found that 95% of severely abusing and 85% of moderately abusing families had no other continuing relationships. Friendships were short-lived and frequently ended in violent quarrels. Such evidence lends support to a treatment model that teaches social skills and assertion training in order to increase the family's social support system (Gambrill, 1973; Heimberg, Montgomery, Madsen, & Heimberg, 1977; Rimm & Masters, 1974). Although these procedures have been applied to mistreating parents very rarely thus far, they have been successfully employed to increase the social contacts of isolated or shy clients (Gambrill, 1973; Gutride, Goldstein, & Hunter, 1973; Twentyman & McFall, 1975).

Depression

Several researchers have commented on the presence of depression in mistreating parents (Browning & Boatman, 1977; Elmer, 1967; Fischoff, Whitten, & Pettit, 1971; Welner, et al., 1977). Though it is difficult to ascertain whether these people were depressed prior to being identified as abusing or neglectful parents, it is interesting to note that the correlation between depression and poor parenting has also been cited in research on depression.

As part of a larger sample, Weissman and Paykel (1974) studied 35 depressed mothers and found that they were considerably more impaired as parents than were 27 matched nondepressed mothers. Particularly

striking was the amount of friction reported. In studying the hostility directly, Weissman and Paykel found that children were the objects of hostility more than any other people, including the women's spouses. They speculated that the reason was that children did not offer as much support as the spouse, demanded more, were more vulnerable, and did not provide immediate negative consequences as the objects of abuse.

Treatment for depression might be an important component of a program to rehabilitate mistreating parents. In addition to medication, several types of therapy appear promising in the treatment of depression. Deficits in social skills have been associated with the development of depression (Libet & Lewinsohn, 1973). Inasmuch as some mistreating parents are socially isolated, the three problems of isolation, depression, and mistreatment might form a triad that should be treated concurrently. For those parents who appear to be deficit in social skills, such training could prove beneficial.

Cognitive approaches have also been found to be effective for the treatment of depression (Beck, 1967, 1972; Shaw, 1977). Beck's cognitive approach presumes that depression is secondary to negative statements regarding self, the external world, and the future. Treatment consists of systematic modification of these faulty thinking patterns. In terms of mistreating parents, it is possible that in addition to feeling inadequate and deficient about themselves, they also have inappropriate expectations and beliefs regarding their child or children. Perhaps a cognitive approach could be used to remediate both sets of faulty cognitions.

CONCLUSIONS

Behavioral theory and intervention have been applied to the problem of child mistreatment to only a limited extent thus far. There is every reason to believe that treatment procedures such as parent training and anger control, which were developed with a different focus, can be applied to the problem at hand. However, it will remain for systematic research applying these therapy procedures to mistreating parents to determine which techniques, components, or combinations of techniques are best used with abusive or neglectful parents.

One topic that has not been addressed and has been studied very little is the effect of abuse on the child. In addition to the application of available therapy procedures to mistreating parents, it is recommended that increased attention be focused on the victims of abuse. Because most attention has been focused on the cessation of physical abuse and protection of the child's life, surprisingly little attention has been given to the need for psychological treatment of the mistreated children. Martin and Beezley (1974) have observed that providing treatment for the parents is not necessarily an adequate treatment plan for the child. In addition to the direct effects of physical trauma (McNeese & Hebeler, 1977), mis-

treated children can exhibit impaired neurological, cognitive, emotional, and physical development as a result of the abusive environment (Martin *et al.*, 1974). The effects of mistreatment on the personalities and behaviors of children has not been systematically studied to date, although psychological problems have been observed and noted by several authors (Kriendler, 1976; Martin & Beezley, 1974; Martin *et al.*, 1974). If mistreated children do indeed suffer from long-term psychological disorders, therapeutic intervention will have to be developed to ameliorate these effects. In addition, professionals need to assess systematically the iatrogenic effects of removing mistreated children from their families and placing them in institutions or foster care. Such separation from the family could exacerbate any existing psychological problems rather than eliminate them as intended (Burt, 1972; Mnookin, 1973; Riscalla, 1976).

Although parent training might be expected to benefit the child as well as the parent, such training might be more beneficial for aggressive than withdrawn children. However, the positive attention that is received by the child in the Hanf program (Forehand & King, 1977; Hanf, 1970; Peed *et al.*, 1977) might facilitate positive interactions between parent and child that could reduce withdrawal. Research on the effects of parent training on the abused child is needed, and specific therapies for withdrawn or depressed victims of abuse might need to be developed.

Child mistreatment is a problem that requires multidisciplinary intervention. Legal, medical, and psychological professionals will have the greatest impact by working in cooperation to determine the best interventions for both children and parents. Behavior therapy procedures offer a great amount by labeling and intervening with the behavior of parents rather than the inferred dynamics of parents' personalities. The procedures discussed in this chapter have been determined to be quite effective for other problems and populations and appear promising in those applications with mistreating parents that have been attempted.

REFERENCES

Ackley, D. C. A brief overview of child abuse. *Social Casework*, 1977, *58*, 21–24.

Anderson, E. A., & Burgess, R. L. *Interaction patterns between same- and opposite-gender parents and children in abusive and non-abusive families.* Paper presented at the 11th annual meeting of the Association for the Advancement of Behavior Therapy, Atlanta, December 1977.

Azrin, N. H., Hutchinson, R. R., & Sallery, R. D. Pain-aggression toward inanimate objects. *Journal of the Experimental Analysis of Behavior*, 1964, *7*, 223–228.

Bandura, A. *Aggression: A social learning analysis.* Englewood Cliffs, N.J.: Prentice-Hall, 1973.

Bandura, A. *Social learning theory.* Englewood Cliffs, N.J.: Prentice-Hall, 1977.

Beck, A. T. *Depression: Clinical, experimental and therapeutic aspects.* New York: Harper & Row, 1967.

Beck, A. T. *Depression: Causes and treatment.* Philadelphia: University of Pennsylvania Press, 1972.

Becker, W. C. *Parents are teachers.* Champaign, Ill.: Research Press, 1971.

Blumberg, M. L. Treatment of the abused child and the child abuser. *American Journal of Psychotherapy,* 1977, *31,* 204–215.

Boisvert, M. J. The battered-child syndrome. *Social Casework,* 1972, *53,* 475–480.

Bordin-Sandler, S. If you don't stop hitting your sister, I'm going to beat your brains in. *Journal of Clinical Child Psychology,* 1976, *5,* 27–30.

Brant, R. S., & Tisza, V. B. The sexually misused child. *American Journal of Ortho-psychiatry,* 1977, *47,* 80–90.

Browning, D. H., & Boatman, B. Incest: Children at risk. *American Journal of Psychiatry,* 1977, *134,* 69–72.

Burgess, R. A., & Conger, R. D. *Family interaction in abusive, neglectful and normal families.* Unpublished manuscript, Pennsylvania State University, 1977.

Burt, R. Protecting children from their families and themselves: State laws and the constitution. *Journal of Youth and Adolescence,* 1972, *1,* 91–111.

Cohen, S. J., & Sussman, A. The incidence of child abuse in the United States. *Child Welfare,* 1975, *6,* 432–443.

Costin, L. B. Protecting children from neglect and abuse. In L. B. Costin, *Child welfare: Policies and practice.* New York: McGraw-Hill, 1972.

David, C. A. The use of the confrontation technique in the battered child syndrome. *American Journal of Psychotherapy,* 1974, *28,* 543–552.

Davidson, W. S., & Rapp, C. A. Child advocacy in the justice system. *Social Work,* 1976, *21,* 225–232.

DeFrancis, V., & Lucht, C. L. *Child abuse legislation in the 1970's* (rev. ed.). Denver: American Humane Association, 1974.

Denicola, J. A., & Sandler, J. *Behavioral and cognitive behavioral training with child abusing parents.* Paper presented at the 12th annual meeting of the Association for the Advancement of Behavior Therapy, Chicago, 1978.

Ebbin, A. J., Gollub, M. H., Stein, A. M., & Wilson, M. G. Battered child syndrome at the Los Angeles County General Hospital. *American Journal of Diseases in Children,* 1969, *118,* 660–667.

Eisler, R. M., Hersen, M., & Miller, P. M. Shaping components of assertive behavior with instructions and feedback. *American Journal of Psychiatry,* 1974, *131,* 1344–1347.

Elmer, E. *Children in jeopardy: A study of abused minors and their families.* Pittsburgh: University of Pittsburgh Press, 1967.

Emery, J., & Howell, J. C. Experts and child abuse. *British Medical Journal,* 1974, *4,* 43–45.

Feindler, E. L. *Developmental consequences of child abuse: A review.* Unpublished manuscript, West Virginia University, 1978.

Fischhoff, F., Whitten, C. F., & Pettit, M. G. A psychiatric study of mothers of infants with growth failure secondary to maternal deprivation. *Journal of Pediatrics,* 1971, *79,* 209–215.

Flynn, W. R. Frontier justice: A contribution to the theory of child battery. *American Journal of Psychiatry,* 1970, *127,* 375–379.

Forehand, R., & King, H. E. Noncompliant children: Effects of parent training on behavior and attitude change. *Behavior Modification,* 1977, *1,* 93–108.

Forehand, R., King, H. E., Peed, S., & Yoder, P. Mother-child interactions: Comparison of a non-compliant clinic group and non-clinic group. *Behavior Research and Therapy,* 1975, *13,* 79–84.

Fomufod, A. K., Sinkford, S., & Louy, V. E. Mother–child separation at birth: A contributing factor in child abuse. *Lancet,* 1975, *2,* 549–550.

Forehand, R., Roberts, M. W., Doleys, D. M., Hobbs, S. A., & Resick, P. A. An examination of disciplinary procedures with children. *Journal of Experimental Child Psychology,* 1976, *21,* 109–120.

Foy, D. W., Eisler, R. M., & Pinkston, S. Modeled assertion in a case of explosive rages. *Journal of Behavior Therapy and Experimental Psychiatry,* 1975, *6,* 135–138.

Fraser, B. G. The child and his parents: A delicate balance of rights. In R. E. Helfer & C. H.

Kempe (Eds.), *Child abuse and neglect: The family and the community.* Cambridge, Mass.: Ballinger, 1976.

Frederiksen, L. W., & Eisler, R. M. Control of explosive behavior: A skill development approach. In D. Upper (Ed.), *Perspectives in behavior therapy.* Kalamazoo, Mich.: Behavioradelia, 1977.

Frederiksen, L. W., & Rainwater, N. *Explosive behavior: A skill development approach to treatment.* Paper presented at the 11th annual Banff International Conference on Behavior Modification, Banff, Alberta, March 1979.

Frederiksen, L. W., Jenkins, J. O., Foy, D. W., & Eisler, R. M. Social-skills training to modify abusive verbal outbursts in adults. *Journal of Applied Behavior Analysis,* 1976, *9,* 117–126.

Friedrich, W. N., & Boriskin, J. A. The role of the child in abuse: A review of the literature. *American Journal of Orthopsychiatry,* 1976, *46,* 580–590.

Galdston, R. Observations on children who have been physically abused and their parents. *American Journal of Psychiatry,* 1965, *122,* 440–443.

Galdston, R. Violence begins at home: The Parent's Center Project for the Study and Prevention of Child Abuse. *Journal of the American Academy of Child Psychiatry,* 1971, *10,* 336–350.

Gambrill, E. D. *A behavioral program for increasing social interaction.* Paper presented at the meeting of the Association for the Advancement of Behavior Therapy, Chicago, 1973. (Cited in E. D. Gambrill, *Behavior Modification.* San Francisco: Jossey-Bass, 1977.)

Garbarino, J. A preliminary study of some ecological correlates of child abuse: The impact of socioeconomic stress on mothers. *Child Development,* 1976, *47,* 178–185.

Gelles, R. J. The social construction of child abuse. *American Journal of Orthopsychiatry,* 1975, *45,* 363–371.

Gelles, R. J. Demythogizing child abuse. *Family Coordinator,* 1976, *25,* 135–141.

Gil, D. G. *Violence against children.* Cambridge, Mass.: Harvard University Press, 1970.

Gil, D. G. Violence against children. *Journal of Marriage and the Family,* 1971, *33,* 637–647.

Gilbert, M. T. Behavioral approach to the treatment of child abuse. *Nursing Times,* 1976, *72,* 126–127.

Giovannoni, J. M. Parental mistreatment: Perpetrators and victims. *Journal of Marriage and the Family,* 1971, *33,* 649–657.

Giovannoni, J. M., & Billingsley, A. Child neglect among the poor: A study of parental adequacy in families of three ethnic groups. *Child Welfare,* 1970, *49,* 196–204.

Gray, J. D., Cutler, C. A., Dean, J. G., & Kempe, C. H. Prediction and prevention of child abuse and neglect. *Child Abuse and Neglect,* 1977, *1,* 45–58.

Green, A. H., Gaines, R. W., & Sandgrund, A. Child abuse: Pathological syndrome of family interaction. *American Journal of Psychiatry,* 1974, *131,* 882–886.

Gutride, M. E., Goldstein, A. P., & Hunter, G. F. The use of modeling and role playing to increase social interaction among asocial psychiatric patients. *Journal of Consulting and Clinical Psychology,* 1973, *40,* 408–415.

Hanf, C. *Shaping mothers to shape their children's behavior.* Unpublished manuscript, University of Oregon Medical School, 1970.

Heimberg, R. G., Montgomery, D., Madsen, C. H., & Heimberg, V. S. Assertion training: A review of the literature. *Behavior Therapy,* 1977, *8,* 953–971.

Hughes, R. C. A clinic's parent-performance training program for child abusers. *Hospital and Community Psychiatry,* 1974, *25,* 779–782.

Jason, L. A. Modifying parent-child interactions in a disadvantaged family. Journal of Clinical Child Psychology, 1977, *6,* 38–40.

Jayaratne, S. Child abusers as parents and children: A review. *Social Work,* 1977, *58,* 5–9.

Jensen, R. E. A behavior modification program to remediate child abuse. *Journal of Clinical Child Psychology,* 1976, *5,* 30–32.

Justice, R., & Justice, B. TA work with child abuse. *Transactional Analysis Journal*, 1975, *5*, 38–41.

Kahn, A. J., Kamerman, S. B., & McGowan, B. S. *Child advocacy: Report of a national baseline study.* Washington, D.C.: U.S. Department of Health, Education, and Welfare, 1973.

Karoly, P., & Rosenthal, M. Training parents in behavior modification: Effects on perceptions of family interaction and deviant child behavior. *Behavior Therapy*, 1977, *8*, 406–410.

Kempe, C. H., Silverman, F. N., Steele, B. F., Droegemuller, W., & Silver, H. K. The battered-child syndrome. *Journal of the American Medical Association*, 1962, *181*, 17–24.

Kent, R. N., & O'Leary, K. D. A controlled evaluation of behavior modification with conduct problem children. *Journal of Consulting and Clinical Psychology*, 1976, *44*, 586–596.

Kimball, W. H., & Burgess, R. L. *A comparison of family interaction in single versus two-parent abusive, neglectful, and control families.* Paper presented at the 11th annual meeting of the Association for the Advancement of Behavior Therapy, Atlanta, December 1977.

Koegel, R. L., Glahn, T. J., Nieminen, G. S. Generalization of parent-training results. *Journal of Applied Behavior Analysis*, 1978, *77*, 95–109.

Kriendler, S. Psychiatric treatment for the abusing parent and the abused child: Some problems and possible solutions. *Canadian Psychiatric Association Journal*, 1976, *21*, 275–279.

Lauer, B., Broeck, E., & Grossman, N. Battered child syndrome: Review of 130 patients with controls. *Pediatrics*, 1974, *54*, 67–70.

Libet, J., & Lewinsohn, P. M. The concept of social skill with special references to the behavior of depressed persons. *Journal of Consulting and Clinical Psychology*, 1973, *40*, 304–312.

Light, R. J. Abused and neglected children in America: A study of alternative policies. *Harvard Educational Review*, 1973, *43*, 559–588.

Mahoney, M. J., & Thoresen, C. E. *Self-control: Power to the person.* Monterey, Calif.: Brooks/Cole, 1974.

Martin, H., & Beezley, P. Prevention and the consequences of child abuse. *Journal of Operational Psychiatry*, 1974, *6*, 68–77.

Martin, H. P., Beezley, P., Conway, E. F., & Kempe, C. H. The development of abused children: A review of the literature and physical, neurologic, and intellectual findings. *Advance in Pediatrics*, 1974, *21*, 25–73.

McNeese, M., & Hebeler, J. The abused child: A clinical approach to identification and management. *CIBA Clinical Symposia*, 1977, *29*, 2–36.

Meichenbaum, D. *Cognitive-behavior modification.* New York: Plenum Press, 1977.

Meichenbaum, D., & Cameron, R. *Stress inoculation: A skills training approach to anxiety management.* Unpublished manuscript, University of Waterloo, 1972.

Meichenbaum, D., & Turk, D. The cognitive-behavioral management of anxiety, anger, and pain. In P. O. Davidson (Ed.), *The behavioral management of anxiety, depression, and pain.* New York: Brunner/Mazel, 1976.

Merrill, E. J. *Protecting the battered child.* Denver: Children's Division, American Humane Association, 1962.

Mersky, H. Pain and personality. In R. H. Sternbach (Ed.), *The psychology of pain.* New York: Raven Press, 1978.

Mnookin, R. H. Foster care—in whose best interest? *Harvard Educational Review*, 1973, *43*, 599–638.

Newberger, E. H., & Daniel, J. H. Knowledge and epidemiology of child abuse: A critical review of concepts. *Pediatric Annals*, 1976, *5*, 15–25.

Novaco, R. W. *Anger control: The development and evaluation of an experimental treatment.* Lexington, Mass.: Lexington Books, 1975.

Novaco, R. W. Treatment of chronic anger through cognitive and relaxation controls. *Journal of Consulting and Clinical Psychology*, 1976, *44*, 681. (a)

Novaco, R. W. The functions and regulation of the arousal of anger. *American Journal of Psychiatry*, 1976, *133*, 1124–1128. (b)

Novaco, R. W. A stress inoculation approach to anger management in the training of law enforcement officers. *American Journal of Community Psychology*, 1977, *5*, 327–346. (a)

Novaco, R. W. Stress inoculation: A cognitive therapy for anger and its application to a case of depression. *Journal of Consulting and Clinical Psychology*, 1977, *45*, 600–608. (b)

O'Dell, S. Training parents in behavior modification: A review. *Psychological Bulletin*, 1974, *81*, 518–523.

Oliver, J. E., & Taylor, A. Five generations of ill-treated children in one family pedigree. *British Journal of Psychiatry*, 1971, *119*, 473–480.

Ounsted, C., Oppenheimer, R., & Lindsay, J. Aspects of bonding failure: The psychopathology and psychotherapeutic treatment of families of battered children. *Developmental Medicine and Child Neurology*, 1974, *16*, 447–456.

Parke, R. D., & Collmer, C. W. *Child abuse: An interdisciplinary analysis*. Chicago: University of Chicago Press, 1975.

Patterson, G. R. Retraining of aggressive boys by their parents: Review of recent literature and follow-up evaluation. *Canadian Psychiatric Association Journal*, 1974, *19*, 142–158. (a)

Patterson, G. R. Interventions for boys with conduct problems: Multiple settings, treatments and criteria. *Journal of Consulting and Clinical Psychology*, 1974, *42*, 471–481. (b)

Patterson, G. R., & Gullion, M. E. *Living with children*. Champaign, Ill.: Research Press, 1968.

Patterson, G. R., Cobb, J. A., & Ray, R. S. A social engineering technology for retraining the families of aggressive boys. In H. E. Adams & I. P. Unikel (Eds.), *Issues and trends in behavior therapy*. Springfield, Ill.: Charles C Thomas, 1973.

Patterson, G. R., Reid, J. B., Jones, R. R., & Conger, R. E. *A social learning approach to family intervention. Families with aggressive children* (Vol. 1). Eugene, Ore.: Castalia, 1975.

Paulson, M. J., & Chaleff, A. Parent surrogate roles: A dynamic concept in understanding and treating abusive parents. *Journal of Clinical Child Psychology*, 1973, *2*, 38–40.

Paulson, M. J., Savino, A. B., Chaleff, A., Sanders, R. W., Frisch, F., & Dunn, R. Parents of the battered child: A multidisciplinary group therapy approach to life threatening behavior. *Life-Threatening Behavior*, 1974, *4*, 18–31.

Peed, S., Roberts, M., & Forehand, R. Evaluation of the effectiveness of standardized parent training program in altering the interaction of mothers and their noncompliant children. *Behavior Modification*, 1977, *1*, 323–350.

Polakow, R. L., & Peabody, D. L. Behavioral treatment of child abuse. *International Journal of Offender Therapy and Comparative Criminology*, 1975, *19*, 100–103.

Reid, J. B., Taplin, P. S., & Lorber, R. A social interactional approach to the treatment of abusive families. In R. Stuart (Ed.) Violent behavior: Social learning approaches to prediction, management and treatment. New York: Bruner-Mazel, 1981.

Rimm, D. C., & Masters, J. C. *Behavior therapy: Techniques and empirical findings*. New York: Academic Press, 1974.

Riscalla, L. M. The professional's role and perspectives on child abuse. *Journal of Clinical Child Psychology*, 1976, *5*, 24–26.

Rogers, S. R. The state vs. the family: Does intervention really spare the child? *Mercer Law Review*, 1977, *28*, 547–552.

Rosenburg, A. H. The law and child abuse. In N. B. Ebeling & D. A. Hill (Eds.), *Child abuse: Intervention and treatment*. Acton, Mass.: Publishing Sciences Group, 1975.

Rosenfeld, A. A., Nadelson, C. C., Krieger, M., & Backman, J. H. Incest and sexual abuse of children. *Journal of the American Academy of Child Psychiatry*, 1977, *16*, 327–339.

Savino, A. B., & Sanders, R. W. Working with abusive parents: Group therapy and home visits. *American Journal of Nursing*, 1973, *73*, 482–484.

Schmitt, B. D., Grosz, C. A., & Carroll, C. A. The child protection team: A problem oriented approach. In R. E. Helfer & C. H. Kempe (Eds.), *Child abuse and neglect: The family and the community*. Cambridge, Mass.: Ballinger, 1976.

Sgroi, S. M. Sexual molestation of children. *Children Today*, 1975, *4*, 18–21, 44.

Shames, M. Use of homemaker service in families that neglect their children. In A. Kadushin (Ed.), *Child welfare services: A sourcebook*. London: Macmillan, 1970.

Shaw, B. F. Comparison of cognitive therapy and behavior therapy in the treatment of depression. *Journal of Consulting and Clinical Psychology*, 1977, *45*, 543–551.

Silver, L. B., Dublin, C. C., & Lourie, R. S. Does violence breed violence? Contributions from a study of the child abuse syndrome. *American Journal of Psychiatry*, 1969, *126*, 404–407.

Steele, B. F., & Pollock, C. B. A psychiatric study of parents who abuse infants and small children. In R. E. Helfer & C. H. Kempe (Eds.), *The battered child*. Chicago: University of Chicago Press, 1968.

Stolz, S. B., Wienckowski, L. A., & Brown, B. S. Behavior modification: A perspective on critical issues. *American Psychologist*, 1975, *30*, 1027–1048.

Sweet, J. J., & Resick, P. A. The maltreatment of children: A review of theories and research. *Journal of Social Issues*, 1979, *35*, 40–59.

Thoresen, C. E., & Mahoney, M. J. *Behavioral self-control*. New York: Holt, Rinehart & Winston, 1974.

Tracy, J. J., & Clark, E. H. Treatment for child abusers. *Social Work*, 1974, *19*, 338–342.

Tracy, J. J., Ballard, C. M., & Clark, E. H. A child abuse project: A follow-up. *Social Work*, 1975, *20*, 398–399.

Twentyman, G. T., & McFall, R. M. Behavioral training of social skills in shy males. *Journal of Consulting and Clinical Psychology*, 1975, *43*, 384–395.

Ulrich, R. E., & Azrin, N. H. Reflexive fighting in response to aversive stimulation. *Journal of the Experimental Analysis of Behavior*, 1962, *5*, 511–520.

Wahler, R. G. Deviant child behavior within the family: Developmental speculations and behavior change strategies. In H. Leitenberg (Ed.), *Handbook of behavior modification and behavior therapy*. Englewood Cliffs, N.J.: Prentice-Hall, 1976.

Wallace, C. J., Tiegen, J. R., Liberman, R. P., & Baker, V. Destructive behavior treated by contingency contrasts and assertive training: A case study. *Journal of Behavior Therapy and Experimental Psychiatry*, 1973, *4*, 273–274.

Watson, D., & Tharp, R. *Self-directed behavior: Self-modification for personal adjustment*. Monterey, Calif.: Brooks/Cole, 1972.

Weissman, M. M., & Paykel, E. S. *The depressed woman*. Chicago: The University of Chicago Press, 1974.

Welner, Z., Welner, A., & Robins, E. Child abuse: A case for a different approach. *Comprehensive Psychiatry*, 1977, *18*, 363–368.

Young, L. R. *Wednesday's children*. New York: McGraw-Hill, 1964.

Zalba, S. R. The abused child: A typology for classification and treatment. *Social Work*, 1967, *12*, 70–79.

Author Index

603

Subject Index