The Comprehensive Handbook of BEHAVIORAL MEDICINE

Volume 2: Syndromes & Special Areas

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Syndromes & Special Areas

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Preface

Many of the greatest strides in medical care have neither been glamorous nor made the front page of *The New York Times*. They have been simple measures such as sanitation, immunization, and provision of clean, wholesome food. And even more glamorous medical breakthroughs and techniques like heart transplants are often last-ditch responses to largely preventable medical problems that required a lifetime to develop. Changing those life styles which may cause, worsen, or exacerbate disease and utilizing current medical knowledge may be the most important strides medicine will make in the next few decades. To meet this challenge, techniques have already been developed to change eating and nutritional patterns that may lead to obesity and heart disease. In addition, interventions are being developed for a wide variety of medical problems. Many of these techniques are based on behavioral principles.

Several years ago, one of the editors of this book gave a behavioral medicine seminar for psychiatry residents concerning behavioral principles and their application to medicine. As the seminar developed, it became evident that many of the important articles on the subject were scattered throughout a wide body of literature, which encompassed a variety of disciplines and journals. No single source was available to provide the state of the art of this emerging field. This book was spawned, in part, as an attempt to overcome this deficit. We wanted to provide a handbook to help health-care practitioners understand and use behavioral techniques appropriate to their areas of interest. However, we also wanted to develop a handbook that would be useful to researchers. To reach both audiences we decided to include a wide range of chapters, some focusing on practical and clinical issues, others focusing on theoretical or technical issues. We encouraged the contributors to speculate about future directions in their areas of specialty. We also decided to include several sections on basic physiology, to illustrate the potential for change in several systems.

Our contributors have been patient and supportive. They have watched as pages of "golden prose" disappeared under the hand of heavy editing. Many made last-minute additions to make their material as up-to-date as possible. And, we have been impressed with the many changes our contributors have undergone in their lives. Some have moved or received promotions, new degrees, and a variety of honors. They have married and

divorced, had children, suffered the deaths of loved ones, and died themselves. Especially in light of these many personal changes, we thank them for their help.

We have also been impressed with the tremendous changes in the field of behavioral medicine. Since the field will undoubtedly continue to change, we intend to add volumes to the Comprehensive Handbook to keep it as up-to-date as possible.

In this work, we would like to acknowledge the help of many individuals. We received editorial assistance from Patricia Benefiel, Ph.D., and Francis Filloux, and many suggestions about content from our colleagues. The manuscript has been typed, retyped, and re-retyped tirelessly by Dottie Pakus. Tome Tomisawa has also helped enormously with preparation of the book. The project has been generously supported by a grant from the Janss Foundation, which helped with the multiple and miscellaneous expenses associated with manuscript preparation, and psychologically supported by the enthusiasm of the Foundation's President, Mr. Joseph Legett.

Introduction

In the second volume of the *Comprehensive Handbook of Behavioral Medicine,* behavioral medicine approaches to the eating disorders, pain syndromes, asthma, skin disorders, and habits in general are discussed. These chapters include a discussion of some of the most intensively evaluated treatment programs; those for obesity; and some of the most successfully treated medical problems, tension and migraine headaches.

Behavioral medicine is defined in the first volume of this handbook as the systematic application of applied behavioral analysis and behavior therapy techniques to medical problems. In the introduction to the first volume, the process of behavioral analysis is described and basic behavioral principles are defined. These principles include applied behavioral analysis, respondent and operant conditioning, discriminative stimuli, extinction, positive and negative reinforcement, shaping, aversion, avoidance, and escape learning. The therapies which derive from them include relaxation therapy, systematic desensitization, token economies, structured milieus, assertion training, modeling, information feedback, biofeedback, and instruction.

In this volume, examples are given of these therapies applied to a variety of medical problems, for example, the use of systematic desensitization to reduce the anxiety associated with an asthmatic attack, a structured ward with a token economy to treat chronic pain patients, the use of relaxation and biofeedback to treat migraine and tension headaches, and contingency contracting as part of the treatment program for patients with anorexia nervosa.

Although the *Handbook* is not intended to provide a how-to-do-it guide for diagnosis and treatment, the authors have provided sufficient information to make it easy to determine what techniques may be useful in a variety of syndromes, and how to implement them in practice. For example, after reading the chapter on bronchial asthma, a clinician should have a better

understanding of the limits, usefulness, and contra-indications to using relaxation for controlling the anxiety associated with asthma attacks. He can pursue more detailed discussions of relaxation and related procedures in the references, or in other chapters in the *Handbook*.

Volume Two begins with a description of the behavioral approaches to bronchial asthma. The management of asthma is difficult and complex. It includes compliance to medication and appointment keeping; recognition of changes in symptoms, requiring changes in medication; attention to allergies, stress, and lifestyle. The management of anxiety, which may contribute to the disability suffered by asthmatics, requires another set of management techniques. The authors provide a comprehensive discussion of the usefulness of a variety of interventions for patients with this disorder.

The eating disorders have been the focus of a large number of articles and books. The largest amount of this literature has been devoted to the most prevalent of the disorders, simple obesity. To some extent, this is because obesity provides an easily measured variable with excellent inter-rater reliability: weight. The four articles in this section review this area of behavioral literature in some depth. Jeffrey and Lemnitzer discuss the "macro-environmental" questions associated with overweight: the questions of national food preferences, advertising and television, lack of exercise, and changing life styles. They suggest that interventions to change the environment might be more fruitful than interventions to change individuals within the environment; for example, making junk food less available in schools might lead to fewer children developing a junk food habit. Hagen reviews the behavioral treatment programs for obesity in some depth. He points out that these programs have a history of only 10 or 15 years, that they are based on postulates rather than observed data, but that they work despite questions concerning their theoretical underpinning. The results are modest, not a panacea, but certainly progress. Drabman and Cordua y Cruz discuss the possibility of differential eating styles in infants, as possible precursors to later eating styles and/or obese body sizes as adults. Coates and Thoresen finish the section on obesity with a discussion of their work with obese adolescents and children. After a detailed look at their own data, they pose the question, "Is there any hope?"

Many books on the market provide self-help diets for weight loss, and programs to be implemented in a group context to provide "do-it-yourself" therapy groups. The limits and possibilities of these programs are discussed in these chapters. Hopefully, in this area of behavioral medicine, where most of the emphasis has been on treating adults, the technologies can be generalized to a younger group, or implemented in family groups with small children, to provide a truly effective "obesity prevention program." Despite hundreds of published papers, the research is still in its infancy. Eating must be viewed as an extremely complex behavior and pattern, with environmental stimuli

which play a major role in the acquisition and maintenance of the behavior. The definition of these stimuli, and the means for their firm control has yet to be defined.

Anorexia nervosa is a rather rare condition in which patients starve themselves, sometimes to death. It is a disorder which has been extensively studied by behavioral scientists in an attempt to determine the stimuli and reinforcers for this bizarre behavioral pattern. The research, which defined the disorder, and the important contributors to its treatment are reviewed in the chapter on anorexia nervosa. The systematic treatment programs which have evolved from this research data are discussed at some length. The clear application of research data to clinical practice is best seen in the treatment of this disorder. Although the cause of anorexia nervosa has still to be elucidated, and its interaction with physiology is still unclear, the positive results of behaviorally oriented treatment programs, at least as a prelude to recovery from anorexia nervosa, is incontestable.

Encopresis is a disturbing symptom in children and adults. Doleys discusses this area of gastrointestinal system dysfunction in detail, and points out the efficacy of biofeedback treatment in the disorder. Finally, a short review of remaining gastrointestinal symptoms points out the other eating and GI tract syndromes, many of which have not received detailed behavioral study and clearly could benefit by systematic study.

The complaint of pain is one of the most common presented to physicians. Chronic pain, especially of the back, is one of the most expensive dysfunctions in the human body, consuming a large percentage of the available health care and rehabilitation dollars. Roberts discusses a behavioral approach to treating chronic pain disorders, and the variety of treatment strategies available to us. Although individuals who have been incapacitated for years are often difficult to work with and are often either shunned by physicians or medicated until they stop complaining, rehabilitation is possible. He describes an inpatient treatment program which is the culmination of many years of research in many academic centers. Roberts views pain as an operant, under the control of environmental stimuli, which is maintained by the reinforcement of narcotic medication and social attention. The chapter by Corley and Zlutnick also reviews the application of behavioral principles to this problem.

At any one time, 10 percent of the United States population suffers from either a tension or migraine headache. It is one of the most common of human discomforts, one that decreases efficiency at work and at play, and significantly interferes with the sufferers' quality of life while not being life threatening. The two chapters on the treatment of headaches describe the various types of headache syndromes, and a variety of interventions that have proven effective. Relaxation and biofeedback have both been used to reduce headache frequency and intensity, and both appear to be efficacious

behavioral treatments. In a final chapter in this section, Melamed and Mealiea discuss behavioral interventions to temporomandibular joint disease.

This volume concludes with a discussion of skin disorders—their behavioral treatment and control. The first paper, which describes the application of treatment modalities to skin disorders raises more questions than it answers; behavioral interventions should work, but to date the literature is scanty. The second chapter on the control of nailbiting and cuticle biting describes a clinical program which is a model for reducing the frequency or intensity of any habit disorder.

Together, Volumes 1 and 2 of the Handbook provide a comprehensive description of behavioral medicine approaches to the various physiological systems and to the medical problems, syndromes, and complaints which are related to them.

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The Comprehensive Handbook of Behavioral Medicine, Volume 2

Introduction to Bronchial Asthma

Asthma in children is a chronic and crippling disorder. Its exacerbations can be frightening to the patient, his family, and the physicians and nurses who deal with a child suffering from an acute asthmatic attack. Asthma was one of the first disorders to be termed "psychosomatic" and to receive a psychoanalytic formulation by French and Alexander in 1941. This formulation was a modification of Eduardo Weiss's observation that asthmatic attacks resembled the "shrieking, helplessly sprawling newborn child with a blood-red swollen face," or a child's "repressed cry for the lost mother." In this chapter, Alexander and Solanch review the basic physiology underlying the asthmatic attack, and the many futile attempts to credit the various psychological theories which purported to explain the etiology of the disorder. As they point out, there is no convincing evidence that the biological pathway resulting in hypersensitivity of airways is in any way the consequence of psychological factors.

Experimentally, attempts have been made at three levels to change the asthmatic process. The authors eloquently suggest that "erroneous beliefs that behavioral treatment should be expected to exhibit clinical impact on asthma *qua* asthma should be abandoned." Although there is a small amount of experimental evidence that bronchial airway resistance can be modified by operant techniques and relaxation, these changes are statistical, and have practically no significance in the severely asthmatic child. Although there are case reports of individuals with asthmatic attacks being treated with relaxation or hypnosis, when airway resistance is measured it has shown that these treatments do not alleviate the underlying physiological symptoms. In

fact, they can lead to a dangerous situation where the physiology is ignored, the relaxed patient is no longer anxious, and he goes home untreated.

Behavioral technology appears to be useful for treating the maladaptive or uncomfortable emotional concomitants of the asthmatic attack. Asthma panic can be dampened by relaxation or biofeedback techniques. Similarly, disruptive asthma-related behaviors can often be changed by an appropriate behavioral program. For example, when it appears that the child is manipulating the family by the threat of asthmatic attacks, the family reinforcement patterns can be modified. The authors point out the value of behavioral programs for motivating the patient and teaching him self-care techniques such as proper use of medication, and an intermittent positive pressure breathing apparatus.

Although Alexander and Solanch describe the research and treatment programs for severe asthmatic children, the technology developed in these cases may be widely applicable; for example, they may be useful for less severe or adult asthma, or other chronic respiratory disorders. The programs developed to aid the child and his family in coping with this chronic disorder have clear applications to other chronic disease states.

The Comprehensive Handbook of Behavioral Medicine, Volume 2

CHAPTER 1
Psychological Aspects in the Understanding and Treatment of Bronchial Asthma

A. Barney Alexander
Larry S. Solanch

INTRODUCTION

This chapter will describe and critically review some recent research concerning the psychological aspects and treatment of asthma. Although it is inappropriate here to discuss current theories regarding the pathophysiology of asthma or to exhaustively and critically review the rapidly expanding experimental literature in the area of asthma research generally, some background orientation will be provided. Before commencing the review of psychological treatment methods, the psychological aspects of asthma will be discussed and a brief summary of the current status of our knowledge in the latter area will be provided.

Asthma is characterized by a hyperresponsiveness of the trachea, bronchi, and bronchioles to a variety of stimuli manifested in an extensive narrowing of the airways resulting in impairment of air exchange. The narrowing of the airway may be due to edema of the cell walls, hypersecretion of mucus, or spasm of the bronchial smooth muscle either separately or in combination. Both the individual significance of each of these factors and the nature of the particular triggering stimulation may vary from patient to patient and from episode to episode in the same patient.

Psychosomatic medicine evolved as a separate specialty between 1920 and 1940. During this period asthma began to emerge as one of the primary

examples of a psychosomatic disorder. While medicine as a whole continued to view asthma as basically an immunological disorder, the focus within psychosomatic medicine was formed in the early 1940s by French and Alexander (25). From a psychoanalytic standpoint, they promulgated the notion that the *origin* of asthma was due to the suppression of intense emotion; specifically, "a suppressed cry for the mother." This influential hypothesis has since led to a great deal of unproductive theorizing and futile investigation. Nevertheless, until very recently the dominant theme among all-too-many psychosomatic investigators and theorizers has been that in some fashion psychosocial variables would be found to play an etiologic role in asthma. There is no convincing evidence that the biological pathology resulting in hypersensitivity of airways is in any way the consequence of psychological factors.

In contrast, the most current view is that psychological disturbance can *result from* the continued battle with chronic illnesses such as asthma and possibly, that in some affected persons at some times psychological factors such as emotional stress may in some unspecified manner *contribute to* the frequency and/or severity of specific episodes of bronchospasm. Hence, some authors (e.g., Creer, 15) are now taking the position that asthma should not be considered a psychosomatic disorder at all. While this may be a somewhat extreme position, there is good reason to be very sympathetic toward this view because the very concept "psychosomatic" has implied an *etiologic* role for psychological events. Continued belief that psychological influences contribute to the *cause* of the pathophysiology in asthma will only divert attention from necessary study of the ways in which psychological variables may affect airways tone in individuals suffering from asthma. Equally important, the classical psychosomatic view only perpetuates the destructive notion, held by most laymen and many professionals, that asthma is often "all in the head." Such a belief is monstrously unfair and often psychologically damaging to asthma sufferers and their families. Further, it can lead to dangerous consequences when applied clinically to persons who are sometimes seriously ill for no "fault" of their own. Appreciation of the role of psychological factors in asthma must become more physiologically sophisticated if continued progress is to be made in understanding this complex disorder.

It may be asked whether there are possible biologic pathways and mechanisms through which psychological events might influence pulmonary function. The answer is cautiously affirmative. Although it is inappropriate here to discuss such mechanisms, it must suffice to say that processes at the level of the limbic system (in particular the hypothalamus), the sympathetic and parasympathetic nervous system, and the peripheral tissue level provide increasingly better understood routes for psychological influence on pulmonary reactions (33).

PSYCHOLOGICAL ASPECTS OF ASTHMA

Two in-depth reviews of the literature on the psychological aspects of asthma are available: Purcell and Weiss (45) and more recently Knapp, Mathé, and Vachon (33). The preparation of the following background material drew liberally on especially the latter of these two fine reviews. A long-standing assumption is that asthma involves some sort of biological vulnerability. Some of the more sophisticated theories regarding the etiologic significance of psychological variables have, of course, implicated stress factors attacking a genetically susceptible organ. However, complete and uncontradictory epidemiological and genetic evidence remains unavailable. While conclusions often differ, so do the sampling and assessment methods and definitional criteria employed by various investigators. Prevalence rates have varied from 2% to 20%. Approximately 60% of asthmatics are under 17 years of age. In this group, boys are almost twice as susceptible as girls, a sex ratio which evens out in adulthood. The best genetic data currently available (23) indicate that hereditary factors may play a less prominent role than previously assumed. The concordance rate in monozygotic twins was only 19% for asthma and 25% for all allergic disorders. A chance of only one in three was found that a child would develop an allergy if both parents were atopic. Further, it was found that the majority of allergic children were born into families where only one or neither parent was atopic.

Psychological factors in the family environment may, in some cases, play a role in the symptomatic manifestation of asthma, although undoubtedly not in its etiology. Clinicians have noticed for many years that some asthmatic children obtained symptom reduction or remission when separated from their families for one reason or another. Peshkin (42) even spoke of "parentectomy" as a therapy for asthma in selected children. The effectiveness of separation was said to be evidenced by the significant number of children whose symptoms remitted abruptly when they were sent for treatments to hospitals such as The National Asthma Center in Denver. Nevertheless, it was possible that the benefits of separation were due to alterations of the physical rather than the emotional environment. In a landmark study, Purcell and his colleagues (44) controlled for physical environment effects by removing the families of asthmatic children to a hotel for several weeks while the child remained home under the care of a child-care worker. When experimentally separated from their families, children judged to have been experiencing emotional exacerbation of asthma displayed small but statistically significant changes in several asthma measures. Although these results implicated general family stress in the manifestation of the disorder, more specific attempts to verify that "rejecting" or "engulfing" mothers *cause* asthma have, as expected, met with lack of success.

The influence of psychological factors in asthma has also been conceptualized by defining a "psychosomatic" subgroup (43) or else dichotomizing asthmatics along an emotional-organic continuum (9). Data suggesting the overrepresentation of psychopathology in both the patients and/or the families of patients whose asthma was not etiologically explicable in terms of organic, especially allergic, mechanisms were offered as support for such conceptualizations. Unfortunately, research of this kind has *not* yielded any consistent experimental evidence that the airways of the individuals so diagnosed are significantly more responsive to psychosocial stimuli in general and stressors in particular. Overall, the best interpretation of these data is as follows: Asthma which is mainly due to allergic causes can be both "explained" and treated rather effectively, and in a straightforward manner. Consequently, the situation is less psychologically complicated for everyone involved. In contrast, when allergic hypersensitivity *cannot* be demonstrated, the affliction is labeled "intrinsic", which is tantamount to stating that it is of unspecifiable origin. As a consequence of the obscure etiological basis and frequently problematic responses to therapy of these individuals, intrinsic asthma is more frustrating and frightening for patient, family, and physician. Since its cause is unknown, it is the kind of asthma that is often claimed to be "all in the head," leading to confused and inconsistent treatment strategies as well as much embarrassment, guilt, and frustration for both patient and family.

It must be emphasized that such an as-yet inexplicable, alarming, and often prognostically pessimistic chronic disease can lead to a truly troublesome psychological situation. Pervasive psychopathology is certainly found in many of these cases, but to date little evidence exists that the psychological difficulties have any direct *pulmonary* consequences to any significant degree. Sometimes these patients and/or their families report "severe" asthma episodes that are not bronchially severe on any particular occasion at all. However, both the patient and those persons directly involved with the patient respond to these situations as if they were serious because of the confusion, fear, and mystery that surround such attacks. Just as frequently, chiefly due to frustration and anger, really serious attacks can be treated as psychological in origin; i.e., as being "just in the head." All of this can have grave psychological/developmental consequences and lead to maladjustment in asthma patients and their families.

The major difficulty of subgroup or continuum conceptualizations has been an overly simplistic approach, one incapable of answering the most important question: Specifically, why should there be subgroups at all? In general, the assumption has been that psychological stimuli will be found to be important for some asthmatics (i.e., a subgroup) all of the time. It is just as likely that psychic factors may be relevant for all asthmatics some of the time; i.e., on certain occasions and under certain circumstances. The safest, most

conservative assertion would be that such psychological stimuli are critical for "some of the people, some of the time." The latter hypothesis is, unfortunately, the most complicated and difficult to empirically research. All things considered, there is simply no persuasive reason to believe that just because a particular individual is atopic, in which instance allergic mechanisms can be *claimed* to explain much of the person's asthma, that psychological influence on the airways in these cases should be any less dramatic than for someone whose asthma is due mainly to nonallergic (i.e., unknown) pathophysiology. The extent to which psychosocial variables may influence pulmonary mechanics in even some sufferers under the most conducive circumstances remains a substantially open and unanswered question.

Investigations seeking to establish the presence of a specific premorbid personality pattern associated with asthma have been carried out even more energetically than the search for family stress influence, but with correspondingly less success. Asthma sufferers have been claimed by one or another writer to be variously overdependent, hypersensitive, overly aggressive, or overly passive (18). Asthmatics have been shown to be more neurotic than normals and to describe themselves in a less favorable light. Nevertheless, when careful comparisons were made between asthmatic individuals and those suffering from other chronic illnesses, differences completely disappeared (40). It is now widely conceded that the frequently obtained personality differences between asthmatics and normals are a result of the disorder itself and are probably only manifestations of the presence of chronic illness. There is no experimental evidence suggesting that *unique* personality factors contribute to, or are associated with, either the development or the manifestation of asthma as opposed to other chronic illnesses. Sustained belief in notions of a premorbid "asthmatic personality" entail the conceptual risk of deemphasizing the importance of the biologic processes underlying the disorder.

Psychophysiological investigations have produced results that are more encouraging. A common clinical observation, often supported by patient report, is that attacks sometimes appear during, or seem to result from, emotional stress. It is well known that emotional arousal (e.g., anxiety) frequently accompanies asthmatic episodes (3). Consequently, a number of attempts have been made to precipitate asthma using such emotional stressors as disturbing films (54), discussions or hypnotic suggestions of stressful life situations (11, 48), recordings of the voice of a patient's mother (28), etc. (33, 45). Such stimuli have proved capable, at times, of producing changes in respiratory patterns and/or very small decreases in pulmonary flow rates, but have never been demonstrated reliably to produce actual asthma attacks. Such effects in the laboratory have been very modest, though often *statistically* significant, and tend to appear only in a very few

individuals. These results do, however, present a paradox. The fact that the therapeutic cornerstone in asthma treatment has been the well-established bronchodilating effects of beta adrenergic drugs at once raises the question: Why should such episodes, accompanied as they are by sympathetic nervous system arousal, result in bronchospasm at all? Mathe and Knapp (36) and their colleagues have proposed a possible answer in a series of experiments suggesting that asthmatics may have some sort of adrenergic defect. These researchers reported that some asthmatics appear to produce less than normal amounts of epinephrine, as indicated by decreased urinary epinephrine excretion, when exposed to experimentally induced emotional stress.

Psychophysiologic attempts to demonstrate that asthma might represent a "vagotonic" disorder, or one characterized by a generalized parasympathetic dominance, have met with no more success. However, recent work by Gold and his colleagues (27) has occasioned a renewed interest in the role of the vagus. They demonstrated that significant bronchospasm can result from mechanical stimulation of vagally mediated epithelial irritant receptors. This form of well-accepted reflex bronchospasm is currently held to be a likely cause of mechanically induced bronchospasm in humans, such as that which results from coughing, some airbone irritants, etc. It is now becoming clear that most examples of so-called emotionally triggered asthma may ultimately be traced to this mechanism. Gasping as a result of surprise, yelling during anger, and crying or laughing which accompanies acute affective states consitute but a few common examples that may respresent "emotional" asthma only very indirectly.

The most compelling lines of research implicating psychological variables in the control of airways tone are the studies on suggestion, relaxation, and placebo effects. Several studies, for example, Luparello, Lyons, Bleecker, and McFadden (35), have indicated that inhaled aerosolized saline can result in bronchoconstriction when the subject is led to believe that the substance is one to which he or she is known to be sensitive, and that the resultant increase in airways resistance can be reversed by a subsequent inhalation of saline believed by the subject to be a standard bronchodilator. However, these effects are found only with very sensitive measurement methods, a fact confirmed by the above investigators. Such evidence further underscores the interpretation that such effects are most likely real, albeit modest indeed. A series of experiments reviewed in a later section concluded that relaxation training may result in small but statistically significant decreases in airways resistance. Finally, it has been shown that premedication with placebo can lead to a significant reduction in the degree of exercise-induced bronchospasm (26).

The possibility that learning or conditioning may influence bronchomotor tone has not gone unnoticed. As far back as 1886, Sir James McKenzie

published an anecdotal report describing a woman who allegedly developed wheezing simply by viewing a paper rose under glass. During the ensuing nine decades, however, no convincing laboratory demonstration of "conditioned asthma" has been reported, even though several writers (e.g., 51) have discussed the possibility of conditioned bronchospasm. It remains only a tantalizing possibility that the circumstances surrounding naturally occuring antigen-induced bronchospasm, or sympathomimetically induced dilation of the bronchi, may be explained by, and hence subsumed under, a standard classical conditioning paradigm. By way of illustration in asthma, the visual and olfactory sensations associated with a weed would represent the conditioned stimulus, whereas the pollen would be the unconditioned stimulus. Prior to conditioning, the bronchospasm in this case would represent the "reflexive" allergic reaction to pollen; i.e., the unconditioned reponse. Following a sufficient number of pairings between weed and pollen, simply seeing the weed should be capable of eliciting some conditioned bronchospasm; i.e., a conditioned bronchospastic response. In the same manner, the stimuli immediately preceding the inhalation of a pharmachological bronchodilator should soon come to elicit some conditioned relaxation of bronchial smooth muscle.

Although the preceding analysis is theoretically compelling, several crucial problems exist. In general, classically conditioned responses (or respondents) have proved to be unstable and/or sometimes difficult to develop at all. With the exception of conditioned responses that are highly adaptive for the organism (e.g., some food preferences, fear reactions, etc.), respondents tend to dissipate, or extinguish, very rapidly if the conditioned stimulus is not repeatedly paired with the unconditioned stimulus. In the illustrative example, this indicates that each occasion in which weed stimuli (even artificial ones) are not actually associated with real pollen, thus producing a "reflexive" bronchial reaction, will constitute an extinction trial. Another difficulty is that the actual model for this paradigm is *long delay* or *trace* conditioning, an even more unfavorable set of circumstances for the development and maintenance of classically conditioned responses. While one can surely interpret the suggestion and placebo effects as due, at least in part, to historical conditioning trials, it is hardly surprising that both of these effects and other examples of "conditioned asthma" have been so elusive. On careful analysis it can be seen that conditioned bronchoconstriction or dilation would tend to develop only infrequently and possibly never to any great degree in any particular case. As has been noted, natural conditioning trials, which must be frequent and occur under optimal circumstances for conditioned responses to develop at all, would in most instances be continually mollified by natural extinction trials.

The possibility of operant or volitional control in the lung has recently been proposed. Vachon and Rich (52) and Feldman (24) have both obtained what

appear to be very small but reliable decreases in airways resistance in some asthmatic subjects following biofeedback training. Complex and expensive instrumentation is required in this work to provide virtual breath-by-breath measurement and feedback of respiratory resistance information. Obviously, this work has profound *potential* basic and applied significance, as does all research on the voluntary control of autonomically mediated physiological functions. Unfortunately, however, it also shares the many difficulties characteristic of all other biofeedback research. To date, carefully controlled experiments have *not* led to an unequivocal demonstration of learned control over any visceral function. Moreover, the research in airways biofeedback has not as yet reached the methodological sophistication of many other areas of biofeedback research; e.g., that of the cardiovascular system. Hence, it is necessary to interpret these results with extreme caution. To suggest at this time that the asthmatic response in the lung is either operantly learned or maintained, or that an asthmatic can be taught to voluntarily control lung function, would be to conjecture in the face of increasingly discouraging data from the field of biofeedback research in general.

To summarize, it would appear on the one hand that despite much belief, hope, and often inspired effort on the part of dedicated investigators with a psychosomatic theoretical orientation, no persuasive evidence has been produced in support of the long-held notion that psychosocial variables play any role, much less a significant one, in the etiology of asthma. On the other hand, psychosocial variables may be capable of exerting at least some influence over pulmonary function and the clinical course of the disease process in some individuals. A somewhat discouraging but completely warranted conclusion for those committed to finding direct psychological influence on lung function is that such influence may be quite modest, probably even when operating at full strength, and of no practical consequence in either explaining or ameliorating the suffering of the majority of asthmatics under most circumstances.

It appears, further, that the susceptibility of the airways to psychologic stimuli is not limited solely to a subgroup of asthmatics or, indeed, even to asthmatics rather than non-asthmatics. The lung of the asthmatic is *hypersensitive* (i.e., more sensitive than usual), but the airways of all persons are reactive to such bronchoconstricting drugs as methacholine and to a variety of mechanical airways irritants. One of the widely accepted methods of testing for the presence of asthma is an aerosolized challenge of the lung with methylcholine. The response to such a bronchial challenge of a person *who will experience symptoms* (that is, an "asthmatic") is many orders of magnitude greater than the response of an individual who will never experience symptoms (i.e., a "nonasthmatic"). Thus, pulmonary hypersensitivity manifests itself as a continuum from "normal" sensitivity to marked hypersensitivity. What often is taken to be a discontinuity between

those who have asthma and those who do not is probably primarily due to the fact that there must be a decrease of at least 25% from normal values before *any* loss of function is detectable at all by either the asthmatic himself or a physician without a lung function measuring device. Further complicating the picture, it is unlikely that all reversible, obstructive lung pathology (i.e., asthma) is due to the same pathophysiological mechanism. As emphasized previously, asthma is a syndrome: To call it a unitary *disease* is analogous to calling stomach ache a disease.

It presently appears that there may be several biologic pathologies involved in the asthma syndrome, one or some combination of which may be responsible in any particular case. To the extent that it occurs at all, it is likely that people will be found to vary in the degree to which their lungs are sensitive to emotional influence in a continuous rather than discontinuous fashion, and that susceptibility will vary not only from person to person but from occasion to occasion in the same person. The nature of the complex interaction between biologic, pathophysiologic, environmental, psychologic, and sociologic variables which would allow one to predict how much some particular psychosocial stimulus will influence lung function in any particular case at a given time still remains to be discovered. The Herculean magnitude of the problem is certainly reflected by the failure of research to date to find any substantial consistencies among asthmatics insofar as psychological variables are concerned.

Before beginning our review of behavioral treatment methods in asthma, a thumbnail description of the asthmatic patient might be helpful. The early-onset (infant or childhood) asthma patient and his or her family face some severe hardships. Children with asthma tend to grow up watching other children play from the living-room side of the front window. Poor self-concepts are common. Academic and social development is often detrimentally affected due to the amount of time lost from school and the restricted and specialized contacts with agemates. These youngsters face both peers and adults who are variously overindulgent or lacking sensitive understanding of their difficulties. A chronic illness such as asthma can cause the child patient to react with shame, embarrassment, and/or demandingness to the extreme. Asthma may become the sole focus about which all family activities and concerns revolve. Parents may feel responsible, guilty, and helpless, and at other times angry and resentful. Such feelings can lead to very inconsistent child-rearing practices. A child with asthma can most certainly learn to manipulate others with illness or use sickness to avoid unpleasant activities or situations. Because asthma can be physically restricting, it is often difficult for the patient to discover his or her true capabilities. Certainly, maladaptive and inappropriate behavior patterns can develop as patient and family struggle with the ravages of this disorder. Besides severely crippling family life, such patterns can retard the social and psychological development

of the child. Undesirable behavior patterns can substantially affect the course of the disorder. Asthma is, to be sure, potentially life threatening, and many patients have experienced bouts of *status asthmaticus* which on occasion may have brought them close to death. Such experience often generate enduring anxiety responses that may manifest themselves in fears of death, hospitals, and treatment, and cause the development of conditioned fear responses that may begin at even the first signs of wheezing. The frantic, worried behavior of both parents and those treating the patient can exacerbate the young patient's fear. As the severity of symptoms varies, so do moods, which in turn are affected by the medications taken.

The late-onset (adolescent or adult) asthma sufferer faces a somewhat different set of problems because the asthma usually disrupts a life style that has become more or less fixed. Adjusting to asthma late in life can be very difficult for the patient and his or her family, often requiring substantial changes in activities and an adjustment to dealing with a chronic disorder. Like the youthful sufferer, the late-onset asthmatic may become frightened of the symptoms and often very scared by and concerned over the side effects of medications. For the families of both young and old the financial burdens encountered in continually fighting asthma are almost always oppressive.

BEHAVIOR THERAPY AND ASTHMA

Following the publication of Joseph Wolpe's influential book *Psychotherapy by Reciprocal Inhibition* (55) in 1958, the decade of the 1960's was the era of the behavior therapy technique called systematic desensitization. With the coming of the 1970's behaviorally oriented clinicians and researchers, now well schooled in relaxation training because of its use in desensitization, began to turn their attention to the potential clinical benefits of the relaxation response itself. Not surprisingly, the application of behavior therapy techniques to the treatment of asthma closely paralleled these developments.

Behavior therapists conceptualized neurotic symptoms as conditioned anxiety reactions, accompanied by maladaptive avoidance responses reinforced by anxiety reduction. Anxiety was seen to have physiological concomitants, as well as unadaptive subjective and behavioral manifestations. Thus, a behavioral formulation was available for the explanation of certain psychosomatic symptoms: In particular, frequent and persistent anxiety responses manifested in part by an exaggerated reaction in some biologically vulnerable target organ. What had been formerly called the phenomenon of secondary gains was now recast as biologic reactions operantly maintained by environmental contingencies (such as sympathy and attention and/or anxiety reduction) as a consequence of those unpleasant situations that the symptoms allowed the patient to avoid. Systematic

desensitization therapy was employed to reduce the anxiety, thereby eliminating both the exaggerated organ reaction and the associated avoidance responses. According to the theory of systematic desensitization, if a response incompatible with anxiety (typically relaxation) could be elicited in a carefully controlled manner in the presence of stimuli normally inducing an anxiety response, then the anxiety reaction could be slowly and systematically deconditioned. Understandably, the first studies reporting on the use of behavior therapy to treat asthma unabashedly made use of this rationale and employed systematic desensitization as a treatment.

The first report of the application of behavioral methods in the treatment of asthma was provided by Walton in 1960 (53). He described the case of a man in his thirties whose asthma attacks were claimed to be the result of anxiety associated with the expression of resentment. Eight sessions of systematic desensitization treatment, using assertiveness as the response to inhibit anxiety, were administered. Patient self-rating was the only measure of asthma employed. Walton reported amelioration of this man's asthma concomitantly with improvement in his social relationships, and at time of publication the patient was asthma free for at least eight months posttreatment.

The next report came in 1964 from Cooper (12). He treated a 24-year-old woman with intrinsic asthma; that is, no allergic involvement could be demonstrated. Cooper considered the woman's asthma to be a conditioned response to anxiety, but because no specific anxiety-arousing stimuli could be associated with her attacks, he postulated that stimulus generalization had occurred. Hence, he decided to use a variant of systematic desensitization therapy in which deep relaxation was used to inhibit anxiety while the emotional states of anger and excitement were evoked by appropriate direct verbal suggestions. Relaxation was taught over six sessions, and the patient practiced relaxation for one hour on her own each day. Following relaxation training, the patient underwent sessions in which increasingly stressful verbalizations or suggestions were introduced while she was deeply relaxed. Again, the only measure of asthma was subjective report. Including a 16-month follow-up, Cooper reported successful treatment, noting that, "training the patient to relax in traumatic situations has effectively raised her 'stress threshold' and rendered her relatively immune to asthmatic attacks precipitated by anxiety" (p. 355).

While it must be acknowledged that these two cases represent pioneering efforts, the difficulties in accepting these reports at face value should be obvious. In neither case was the actual diagnosis of asthma, nor its extent and severity, firmly established by reliable clinical and pulmonary physiological means; likewise, outcome was assessed only by self-report. It cannot be overemphasized that inferences regarding the presence of, or changes in, asthma must be based upon knowledgeable physiological measurement. With

the benefit of hindsight, we can also seriously question the rationale upon which the treatment in these cases rested: Namely, anxiety mediated asthma attacks, the existence of which remains unsubstantiated. These problems, in association with the uncontrolled nature of these interventions, leave open the distinct possibility that any changes that might actually have occurred were due to other factors including, but not limited to, spontaneous change in the asthma, physical environment alterations, other treatment, or change in the patients' own attitudes regarding their disorder, etc.

The first controlled experiment on the application of behavior therapy to asthma was reported by Moore in 1965 (38). She compared systematic desensitization with both relaxation alone and relaxation accompanied by suggestions of symptom remission, hypothesizing that both subjective and pulmonary functional change would be greatest with systematic desensitization treatment. Somewhat contrary to expectations, Moore found no differences between groups on the subjective symptom measures but did detect a small average improvement in lung function during systematic desensitization treatment. This study is noteworthy because it represented the first report of any kind to include physiological assessment and some attempt at experimental control. Unfortunately, however, the pulmonary functional measurement consisted of peak expiratory flow rate measures at a frequency of one per week. While Moore is to be commended for the inclusion of pulmonary function assessment in her study, the measurement frequency employed allows no reliable conclusions whatsoever to be drawn regarding either the immediate or long-term effects of systematic desensitization or relaxation techniques on pulmonary physiology (10).

The most recent investigation of systematic desensitization therapy in asthma was conducted by Miklich and his colleagues (37) at the National Asthma Center. This large-scale clinical outcome study was intended as a simple comparison of systematic desensitization with a no-treatment control. In contrast to Moore's study, twice *daily* pulmonary functional measurement (1 second forced expiratory volume) was obtained throughout the long duration of this experiment. The subjects were 26 severely asthmatic boys and girls (mean age of approximately 11 years) in residence at the center. The study was divided into five phases: A 16-week baseline period, a 10-week treatment period, a 9-week posttreatment assessment period, followed by an 11-week interim period during which no measures were taken and, finally, a 6-week follow-up period. The subject sample was divided, essentially randomly, into 19 children who were given systematic desensitization treatment and seven children who received no treatment. The unequal distribution between groups was due to a nonbiasing protocol which consisted of assigning children to one of five therapists as therapists and children became available. Only when a child was ready for inclusion in the experiment, but no therapist was available, was that child then assigned to the control group. Management

of all children was similar throughout the investigation, with the exception that during the treatment period control subjects received no intervention. In addition to pulmonary physiological measures, assessments were made as well of medication requirements, number of hospital admissions, and daily symptom severity (audible wheezing which did not require any kind of symptomatic therapy). While the therapy followed the standard clinical protocol for systematic desensitization therapy, consisting of hierarchy development, relaxation training (modified progressive relaxation), and desensitization proper, considerable latitude was provided the therapists so as to individualize the exact conduct of the behavior therapy according to the clinical requirements of each individual child.

The results of this investigation were none too encouraging. The only measure to produce any statistically significant difference between the experimental and control groups was morning lung function. The difference was very small and was primarily due to a decline in flow rates in the control group rather than a significant increase in pulmonary function for the treated subjects. Apparently, it can now be quite firmly concluded that systematic desensitization behavior therapy does not provide a clinically significant, long-term therapeutic impact on *lung function* in severely asthmatic children. Whether this conclusion holds for less severely ill children or adults of any severity has still not been experimentally tested. However, because the soundness of the rationale upon which the application of this approach to asthma is based must be seriously questioned, it is probable that anxiety reduction behavior therapies should not be expected to alter the actual pulmonary response in asthmatics of any age or severity.

RELAXATION AS AN ADJUNCTIVE TREATMENT FOR ASTHMA

The potential benefits to asthmatics of relaxation itself (rather than simply as one aspect of a package including other treatment modalities) has also received considerable attention. Since Jacobson (29) introduced progressive relaxation therapy in 1938, it has been commonplace for physicians and others treating asthmatic patients to ask them to sit quietly or try to relax at the onset of and/or during asthma attacks. Patient report and clinical experience both suggested that such a procedure may help mollify or alleviate wheezing.

The first experiment on the effects of relaxation alone was reported by Alexander, Miklich, and Hershkoff (7). In this study, 20 children were offered 6 sessions of modified progressive relaxation training (41), while another group of 16 children (matched with the first group on age, sex, and as closely as possible on the severity of asthma) received an equivalent number of sessions during which they simply sat quietly. Represented in this ample were

youngsters whose asthma ranged in severity from moderate to very severe. Before and after each session, pulmonary function was measured by a peak expiratory flow rate meter, and the children rated their feelings of relaxation on a scale from 1 to 10. The main interest in this study was to investigate the *immediate* effects of relaxation on pulmonary functioning. Hence, no attempt was made to assess the potential long-term benefits of the regular practice of relaxation. Results indicated a statistically significant average increase of 21.63 liters per minute for the relaxation subjects, representing about an 11% improvement in pulmonary function, compared to a nonsignificant mean decrease of 6.14 liters per minute for the children in the resting condition. Subjective feelings of relaxation were found to increase significantly over each session for children receiving relaxation training, compared to no change for children who were resting quietly.

These results were replicated by Alexander (1) with a new group of children comparable to those participating in the first experiment. This sample of 25 children was divided into six groups of four or five children each, and in general the same procedures employed in the previous investigation were used. Ten daily sessions were held. In the first five, subjects merely rested quietly; this was followed by five relaxation training sessions. Immediately before and after every session, measurements of PEFR and "state" anxiety were obtained. At the first session of the experiment, all subjects also completed the Spielberger Trait Anxiety Questionnaire (49). A unique feature of this study was an attempt to discover if there was any way of predicting which child would be most likely to respond beneficially to relaxation; e.g., if relaxation is considered to be a simple extension of resting or inactivity, then the response to resting might predict the response to deliberate relaxation. The second potential predictor variable employed in this investigation was the Precipitant Interview developed by Purcell and Weiss (45). This interview had been used by Purcell and his collaborators in their study on experimental separation (44) mentioned earlier. The purpose of this interview is to reliably discriminate those children for whom emotional precipitants seemed to be possible triggers of asthma attacks from those children for whom emotional precipitants appeared to play no important role. Finally, each child was asked a standard series of question's intended to find out what, if indeed anything, in a given child's experience might constitute a reliable indicator regarding whether or not relaxation training would have beneficial effects for that child.

The use of the precipitant interview requires some special comment, inasmuch as inclusion of the instrument in this study can best be understood in relation to the vintage of this experiment. At the time (1970), the notion of subgroups, to which the precipitant interview had been applied, had only begun to be scrutinized to the degree reflected earlier in this chapter. Concurrently, there was still a lingering belief in the field that anxiety and

psychological conflict may mediate some asthma attacks. In retrospect, subsequent empirical tests of these notions discredited them beyond reasonable doubt. Obviously, however, this could not be known *a priori.* Hence, these factors were included for study.

The results were analyzed in a manner similar to the initial study. The average amount of PEFR change during relaxation of 23.5 liters per minute was almost identical to that obtained in the previous study. During resting, there was a nonsignificant increase of 1.52 liters per minute. The difference between these two values was statistically significant. However, no significant relationship was found between the response to sitting quietly or resting and the response to relaxation, a result suggesting that purposeful relaxation could not be considered simply as an extension of resting. Such an outcome, of course, precluded the possibility of predicting a child's response to relaxation by his response to inactivity. Also, no relationship was found between trait anxiety scores and the response to relaxation, nor was any relationship evident between the amount of anxiety reduction during a relaxation session and the pulmonary functional response to relaxation. Similarly, no relationship existed between the response to relaxation and the child's prediction of success based upon the answers to the questions regarding past experience with relaxation. Finally, no clear support was found for an increased incidence of response to relaxation in those children selected by the precipitant interview as possibly having more emotional involvement in their asthma.

While an immediate positive effect of brief relaxation on lung function had now been found in two studies, it was still necessary to be very cautious about the significance of this finding. First, pulmonary functional changes had been measured only with the *PEFR,* the most variable and least sensitive index of airways dynamics. While the ease of obtaining this measure of pulmonary function makes it an excellent choice where considerations of time, cost, circumstance, or frequency of desired measurement are concerned, it was nonetheless clearly necessary that the relaxation effect be validated with a more definitive pulmonary functional measure. Second, these studies had only established that relaxation produced an effect measured immediately after a 20-minute period of relaxation. To be of any substantial clinical benefit, even if the therapy was only intended to provide short-term or symptomatic relief, it must be shown to provide benefit for at least an hour. Desirable pulmonary changes enduring only *in situ* (i.e., exclusively during the actual period of relaxing and/or very shortly thereafter) would be of very little therapeutic value. In other words, the issue is one of generalization of therapeutic gains to the natural, extralaboratory environment of the patient. Third, these laboratory investigations of relaxation had been attempted only on children whose functional status was below normal, but not in the frankly symptomatic range. Pulmonary physiology must drop below approximately

75% of normal before any subjective or clinical impairment of functional capacity is noticed. Fourth, it must be emphasized that the scope of the changes obtained thus far fell, on the average, far short of clinical significance in any case. Although they suggested a clear potential for clinical application, it nevertheless remained necessary to demonstrate the capability of relaxation to produce far greater increases in flow rates (on the order of 25% to 100%) during those times when children were experiencing frank asthma attacks. In both of the studies described above, the increase in pulmonary function had averaged just 11%.

A third, much more definitive experiment, which was specifically designed to deal with these shortcomings, is now available (5). Fourteen children, similar in all respects to the children investigated previously (1, 7), were studied. Each child served in 11 laboratory sessions divided into three distinct phases. The first phase involved simple resting, in which the effects on pulmonary function of inactivity or resting quietly were assessed as a baseline against which to evaluate the effects of relaxation. The second phase involved relaxation training, and the third phase was comprised of sessions in which the child relaxed as trained in phase 2 in order to assess the effects of relaxation in comparison with the baseline resting phase. With the exception of activity peculiar to each phase of the experiment (namely, resting, training, or relaxing), all sessions were identical; i.e., of 20 minutes duration. Each session consisted of a pretest pulmonary functional assessment followed by a period in the laboratory relaxation room, during which the child either rested, was trained, or relaxed on his own. Following this period, the first posttest of pulmonary function was implemented. Subsequently, three similar pulmonary functional assessments were conducted at one-half-hour intervals. This extended the period of careful observation to approximately 1½ hours postrelaxation. Well-accepted, standard lung function tests were used. Each pulmonary function testing, performed by a trained pulmonary technician blind to the hypotheses being tested, involved measurement in the whole body plethysmograph, followed by a slow vital capacity and two forced vital capacity efforts. From these measurements, a large amount of information regarding lung volumes, flow rates, and resistance to flow in the airways can be calculated. During all resting and relaxing sessions, frontalis EMG, heart rate, respiration rate, skin conductance, and digital skin temperature were monitored.

All data were expressed as percents of the predicted value for that child. For each variable, a child's resting response was averaged as was his or her relaxation response. For data analysis and presentation, means were subsequently computed for the group of 14 children. It was found that during rest there was a persistent tendency for pulmonary function to manifest a consistent, and in most cases monotonic, decline from the pre-testing occasion to the fourth posttest. This was due to the fact that testing on each

occasion was initiated at a point six hours subsequent to the last administration of maintenance bronchodilator; hence, pulmonary function was declining due to the absence of medication. In contrast, the average relaxation response was a statistically significant shift toward maintenance of functions at the pretesting level. Nevertheless, the effect was small and again failed to approach *clinical* significance. With respect to the other physiological measures, there were statistically significant trends towards lower EMG and heart rates during the relaxation as opposed to resting sessions.

Since the work on relaxation in asthmatic children began, several other studies investigating relaxation effects have appeared in the literature. Tal and Miklich (50) reported small but statistically significant pre-post session increases in one second forced expiratory volume (a measure related to PEFR but more reliable) following each of three sessions of very brief "quasi hypnotic tape recorded relaxation instruction," in 60 National Asthma Center youngsters. In addition to short-term effects, long-term effects of relaxation have also been studied. Davis, Saunders, Creer and Chai (22), in an experiment conducted at the National Asthma Center, investigated 24 asthmatic children similar to those studied in the original experiments. The sample was divided into three groups of eight children each: group one was given tape-recorded progressive relaxation training; the second group was given identical taped instructions accompanied by forehead EMG biofeedback; and the third group (control) read assorted light material and was told to just relax. These investigators provided no information regarding how biofeedback was combined with the muscular relaxation procedures.

The study was divided into three phases: Baseline for eight days, followed by five treatment sessions and, finally, a posttreatment assessment period of eight days. Before and after each treatment session, and additionally three times per day throughout the duration of the study, peak expiratory flow rate measures were obtained. No overall differences among groups were found either in terms of immediate changes over sessions, or between baseline and postassessment phases. However, during analysis, the sample was divided into those children who were receiving corticosteroid maintenance therapy (regarded by the investigators as more severe asthmatics), and those who were not receiving corticosteroid therapy (regarded by the investigators as less severe asthmatics). It was found for the less severe group that both relaxation methods produced slightly greater immediate changes in PEFR than those exhibited by the control group. Furthermore, the group receiving relaxation training supplemented by biofeedback manifested a slight, though not statistically significant, advantage relative to the group receiving unsupplemented relaxation training. Nevertheless, the lack of clinically significant benefits delineated earlier was still evident: No differences were found between baseline and postassessment periods for daily PEFR readings

in either severity group. While biofeedback assistance seemed to provide a modicum of additonal benefit compared to simple relaxation training in these children, the frontalis EMG data did not support this finding. Both relaxation groups produced lower frontal EMG than the control group, but did not differ from each other. Moreover, no relationship was found between the amount of PEFR change during sessions and the corresponding changes in EMG. Hence, while EMG biofeedback *may* have provided some additional benefit, the explanation underlying this advantage remains unclear.

Scherr, Crawford, Sergent, and Scherr (47) reported a similar study of 22 asthmatic children during summer residence at Camp Broncho Junction. During an eight-week treatment program, these children received one-half-hour sessions of relaxation training three times weekly between the second and seventh weeks of camp, inclusive. As in the Davis et al. study cited above (22), relaxation consisted of a modified Jacobson program supplemented by forehead EMG biofeedback. Again, no specification was provided regarding the procedure used in combining the two methods. This intervention was compared with a no-treatment control group of 22 children. Peak expiratory flow rates were routinely obtained on all children three times daily. Both groups manifested improvement on the asthma measures used in the study when compared to the control group; however, children receiving the experimental relaxation program manifested statistically greater improvement in terms of average PEFR from the first to the eighth week of the study, as well as greater reductions in the number of infirmary visits, number of asthma attacks, and steroid usage. Still, the authors very prudently suggested caution in interpreting these findings since no attempt had been made to control for the special attention given the experimental subjects, and the medical staff independently rated members of the control group as having more severe asthma than the subjects in the experimental group.

The two studies just reviewed both used a combination of muscular relaxation and EMG biofeedback. In another study carried out at Broncho Junction (34), Kotses and his colleagues attempted to investigate the distinct contribution of EMG biofeedback training. They randomly divided 36 asthmatic children (mean age 12 years) into three groups of 12 subjects each: Contingent feedback, noncontingent feedback, and no treatment. Children in the contingent and noncontingent groups participated in three laboratory sessions per week for three weeks. For experimental purposes, each noncontingent subject was permanently yoked throughout the duration of the study to a randomly selected contingent feedback subject, and children in both groups were told to try to lower the feedback tone. The first two laboratory sessions of each week consisted of 20 minutes of feedback, whereas the third session was always a no-feedback, "test" session. No experimental attention whatsoever was provided to the no-treatment subjects. As in the previous study at Broncho Junction (47), measures of peak expiratory flow

rate were obtained three times daily on all children but not immediately before and after each session. Results indicated that children in the contingent feedback group manifested a statistically significant increase in weekly mean PEFR compared to children in the noncontingent and no-treatment groups. The latter did not differ from each other. EMG data indicated decreased frontalis muscle tension for the feedback subjects relative to *increased* muscle tension in the noncontingent group.

There are two major difficulties with this study. First, as in the Scherr et al. experiment described above (47), the notreatment group did not constitute sufficient control for the attention given to experimental subjects. Although it may appear that the noncontingent yoked control group controlled for this variable as well as for the presence of the contingent feedback stimulus, closer, more careful scrutiny reveals this probably was not the case at all. Because subjects in both groups were told to attempt to lower the feedback tone (that is, to control frontalis muscle activity), noncontingent subjects were in reality presented with an impossible task. Whereas this instruction is fine for subjects receiving true contingent feedback, noncontingent subjects can easily discover that the feedback stimulus bears no relationship whatever to muscle tension, or indeed to anything about their behavior, and thus can realize that the task is hopeless relative to the instructions presented to them. As discussed by Alexander, White, and Wallace (6), this can result in a counter-motivated situation in which frustration and even anger are prominent features. As a consequence, performance can suffer accordingly. It is therefore hardly surprising that subjects in the noncontingent group manifested an increase in frontalis muscle tension during sessions and experienced no "relaxing" effect as measured by PEFR changes.

The experiment by Davis et al. (22) and the two investigations carried out at Broncho Junction (34, 47) addressed a question rather different from that focused on in the studies done by Alexander and his colleagues (1, 5, 7): Namely, the effect of regular relaxation practice extending over periods of several weeks on frequent measures of pulmonary function obtained at times other than before and after the relaxation sessions. Davis et al. (22) studied both immediate and long-term effects of relaxation, finding no evidence for long-range effectiveness, whereas the Camp Broncho Junction studies found small but statistically significant increases in average peak expiratory flow rates over several weeks of training. While it is tempting to interpret the Broncho Junction results as suggesting that the regular practice of relaxation may have long-range benefits, the lack of attention placebo control and the other methodological problems in these studies preclude the drawing of this conclusion. When attention placebo control, as in the Davis et al. experiment (22), was included, long-term benefits failed to materialize. Analogously, it is impossible to conclude that either biofeedback alone or relaxation in conjunction with, or supplemented by, frontalis EMG biofeedback is an

effective "relaxation" technique with which to bring about changes in pulmonary function for asthmatic children. Other research, albeit on nonasthmatic adults (2, 6), indicates rather clearly that EMG biofeedback procedures should not be considered an effective relaxation training method (8).

OTHER BEHAVIORAL METHODS IN THE TREATMENT OF ASTHMA

The difficulties in the treatment of asthma extend well beyond wheezing. As with most chronic illnesses, treatment should be approached from the standpoint of management and rehabilitation (17) due to the presence of many problems which essentially *result from* having the disorder and constantly struggling to cope with and adapt to it. These disease-related problems include difficulties in medical compliance, maladaptive behaviors of adjustment and development, untoward specific emotional reactions, mood disturbances, etc. Thus far, all of the studies discussed have been exclusively concerned with interventions intended to alter the primary problem in asthma; namely, lung function. The use of behavioral methods within the rehabilitation context, where the intent is to alter maladaptive asthma-related behaviors rather than to reverse lung pathology, has also received attention. Despite the fact that such problems occur with no less frequency and urgency in adult asthma, to date the majority of reported applications of behavioral methods to asthma-related behaviors have been concerned with the problems accompanying chronic asthma in children. These applications have also been reviewed by Creer (15) using the organizational scheme followed here.

The well-established fact that human behavior is to a large extent controlled by its consequences provides the basic rationale underlying most behavioral approaches to mental health problems. If, on the one hand, a behavior is followed by a reward or desirable consequence, or the removal of an ongoing aversive or undesirable situation, then the probability of that behavior occurring in the future is increased. On the other hand, if a behavior is followed either by an aversive consequence or by the removal or enforced unavailability of a rewarding circumstance, then the probability of that behavior being repeated is correspondingly reduced. Intervention methods based upon the deliberate application of these two elegantly simple principles have been used to good effect in the rehabilitation and management of asthmatic youngsters. Techniques designed to increase the probability of a response (i.e., strengthening effects) include procedures that have been labeled positive and negative reinforcement. Techniques intended to decrease the probability of response (i.e., weakening effects) include procedures such as satiation, response cost, time out, extinction, counterconditioning, and

punishment. Reports in the literature concerning the application of each of these procedures as they have been implemented in the rehabilitation of asthmatic children are reviewed below.

Positive Reinforcement

The use of *positive reinforcement* and shaping to train asthmatic children in the proper use of inhalation therapy equipment was employed by Renne and Creer (46). They treated four asthmatic children who could not correctly use an intermittent positive pressure breathing device, a circumstance which hindered adequate symptomatic treatment for their asthma. This device automatically delivers a broncho-dilating drug to the lungs under positive pressure. Employing a multiple baseline design for experimental control, all four children were taught to use the machine by positively reinforcing, with script and backup reinforcers, 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. Of particular note is that in a second phase of the experiment, nurses were taught how to employ the positive reinforcement procedure and similar results were obtained on two additional youngsters.

Three attempts to influence lung function itself by positive reinforcement procedures have also been reported. Khan, Staerk, and Bonk (30) gave a group of ten severely asthmatic children five sessions of so-called "linking training," during each of which a continuous series of forced vital capacity efforts were reinforced by praise and a red light whenever a particular "blow" on the spirometer was greater than the immediately preceding one. Following this phase, the children received ten similar training sessions after mild bronchospasm had been induced experimentally by a variety of means differing from child to child. No data are provided regarding the success these children had in successively increasing flow rates, but comparison of baseline data with measurements ten months after completion of the training sessions indicated that the children thus "trained" were significantly different from ten other asthmatic children, who had received no treatment or attention of any kind, on amount of medication required, the number of emergency-room visits, and the number of self-reported asthmatic attacks. The authors conceptualized their procedures as "biofeedback conditioning." This is rather presumptuous given the fact that no real specification of "conditioning" procedures was delineated, no data are provided regarding whether or not conditioning even occurred, and none of the necessary controls for a learning experiment was in fact present. The results obtained were themselves uncontrolled in relation to nonspecific, attention-placebo effects.

In a similar but considerably more carefully designed and executed study, Danker, Miklich, Pratt, and Creer (21) found neither immediate nor long-term increases in flow rates as a result of contingent reinforcement for successively higher forced expirations. They also failed to find any overall improvement in a variety of other indices of asthma. More recently Khan (31) reported the results of another experiment methodologically similar to that just described (30). In this investigation, the experimental and control groups were each divided into predicted reactors and nonreactors on the basis of pulmonary response to placebo suggestion as employed by Luparello, Lyons, Bleecker, and McFadden (35). Once again, "conditioning" was claimed to have transpired, but was not demonstrated and, as before, there were inadequate controls for the confounding effects of attention, length of contact, expectation, and suggestion. No differences were found between predicted experimental reactors and nonreactors. Curiously, Khan interprets the results as demonstrating success for his rather peculiar treatment package even though the control reactor group manifested as much change on all measures as the group exposed to treatments. As was previously the case, no pulmonary function measures were employed in outcome assessment.

Satiation

When reinforcement is available in such large quantities over an extended period of time that it tends to loose its effectiveness, *satiation* is said to have occurred. This results in a decrease in frequency of behaviors supported by that reinforcer. Creer (15) 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). Even though his asthma was judged actually not to require such admissions, his physician had consistently capitulated to his pleadings. After each brief period of hospitalization, he would claim he was well and request release. Subsequent to behavioral analysis, Creer decided to hospitalize the boy for three days each time he requested admission, hypothesizing that satiation would occur (i.e., that a three-day stay on each occasion would lead to a reduction in the effectiveness of the hospital as a reinforcer for his avoidance responding). The data supported this rationale. During the eight months piror 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 eight 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; e.g., medication requirements, daily lung function tests, etc.

Extinction and Counterconditioning

Neisworth and Moore (39) employed a simple *extinction* procedure to reduce coughing episodes in a seven-year-old asthmatic boy. Although coughing is a frequent concomitant of asthma, this child's physician felt that the amount of coughing displayed was inconsistent with the severity of his disease. Behavioral analysis revealed that parental attention was probably maintaining the coughing behavior, which occurred particularly at night. To initiate the intervention, the child's parents were instructed not to interact with their son once he was in bed. In accord with expectations, the procedure resulted in a rapid and systematic reduction in the coughing behavior.

Earlier, several reports of the use of systematic desensitization therapy (counterconditioning) with asthmatics were described (11, 37, 38, 53). The rationale in all of these examples was the reduction of adverse emotional responses assumed to be a contributing or even primary cause of the wheezing. We have also seen that there is currently little reason to believe that this rationale is sound although maladaptive emotional responses are certainly a prominent characteristic of the asthma syndrome. Kinsman and his colleagues (32) have demonstrated the existence of five relatively independent, valid symptom dimensions in asthma: Panic-fear, irritability, fatigue, hyperventilation-hypocapnia, and, finally, airway obstruction itself. Of the two emotional dimensions, irritability has received no systematic attention, whereas panic-fear has been the focus of much empirical research. Because asthma is characterized by periodic, acute attacks that can often be life threatening, the circumstances surrounding such severe asthma attacks are ideal for the establishment of conditioned emotional reactions, in particular fear responses which can attain panic proportions in some individuals.

Although little support exists for the assumption that such responses have *direct* pulmonary consequences of any significance, indirect influences are clearly possible. For example, panic reactions can interfere with patient cooperation in emergency treatment, induce and maintain hyperventilation, and exacerbate severe psychological discomfort, which would otherwise remain relatively minimal. Such conditioned fear responses generalize to situations far in advance of acute attacks (as evidenced, for example, by mild wheezing) or even the anticipation of possible asthma episodes. Fear-reduction behavior therapies based on counterconditioning or extinction principles (e.g., systematic desensitization or implosion) should in principle be an ideal treatment strategy for dealing with this *asthma-related* maladaptive behavior pattern, and the efficiency of this approach should be no less than the well-documented effectiveness in the treatment of other fears or phobias. Although no controlled experiments or case studies have appeared regarding this issue, both Creer (14) and Alexander (6) have

described clinical procedural examples of the successful use of such a treatment strategy for dealing with the asthma panic reactions in asthmatic youngsters. In these cases, there were no expectations that changes in the asthma itself would occur; only that a troublesome "side effect" of the disorder would be successfully altered.

Time Out From Positive Reinforcement

Removal of a positive reinforcer for a specified period of time contingent upon the occurrence of a specific inappropriate behavior constitutes a procedure that has been called *time out*. Creer and his colleagues (13, 19) have provided two reports of the use of time-out procedures to treat malingering in asthmatic children hospitalized at the National Asthma Center. In each case, a reversal design consisting of baseline, time out, reversal (return to baseline contingencies), and time out was employed. Intervention in both cases consisted of placing the children in rooms by themselves, removing TV, comic books, games, etc., and in general making the environment dull and strictly "therapeutic" each time they requested inappropriate hospitalization. Appropriateness (medical need) was judged by the admitting physician, who was blind to the presence of an experimental intervention. In each case, results indicated a dramatic reduction from the baseline rate of both the frequency and the duration of hospital visits when the time-out procedure was introduced, a slow return to baseline levels during the reversal phase, followed by a renewed reduction in frequency and duration of hospitalizations when the time-out procedure was reinstated. Again, no other indices of asthma were found to change during the period of investigation, underscoring the specificity of the treatment.

Response Cost

This procedure is much like time out except that it involves the contingent withdrawal of a specified amount of reinforcement rather than withdrawal of reinforcement over a specified period of time. Creer and Yoches (20) reported the case of two asthmatic youngsters who suffered disadvantages in school as a result of the repeated absenteeism required by their asthma. Behavioral analysis in these cases revealed that the children had failed to acquire a basic skill required for successful classroom work; i.e., attending to classroom materials. A *response-cost* procedure was developed with the experiment being divided into four phases. In the preexperimental phase, a behavioral analysis was performed to identify the target behavior. During the baseline phase, and subsequently throughout the experiment, two observers independently and unobtrusively recorded the number of nonattending behaviors exhibited by the two boys in the natural classroom setting. For the

first two days of the treatment phase, each boy was seen individually and given attention training in a special experimental room. At the beginning of training, each youngster was credited with 40 points at the start of each session. It was carefully explained to the youngsters that the full amount could be retained and later exchanged for backup reinforcers if the child followed instructions and attended to classwork. Any incidence of nonattending, signaled by the click of a counter, occurring during the 30-second scoring periods resulted in a deduction of one point from the child's balance. During the third and fourth days of the treatment phase, the subjects were seen together in the experimental room and a new contingency was instituted. At this time, any occurrence of nonattending by either of the children resulted in a loss of points for both. During the reversal or extinction phase, the subjects were seen together but the contingencies were not employed. Positive results were obtained with both boys. The number of nonattending behaviors in the experimental room decreased during the treatment period and returned to near baseline levels during the reversal period, as did the number of nonattending behaviors in the classroom. Hence, these boys demonstrated both the development of the skill in the experimental room and its generalization to the natural classroom setting.

Negative Reinforcement and Punishment

Negative reinforcement is defined as the response-contingent removal or avoidance of an aversive stimulus, while *punishment* entails contingent presentation of an aversive stimulus. The first should lead to an increase in the probability of the response contingent upon removal or avoidance of the aversive stimulus, whereas the second is designed to promote and maintain response suppression. Although widespread use, both overt and covert, of aversive control of behavior exists in our society, ethical considerations demand that the explicit therapeutic employment of aversive procedures should be undertaken with much caution and only in carefully selected cases. Aversive therapeutic methods usually represent the treatment of last resort, but sometimes they 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 Cardoso (4). This 15-year-old boy had suffered from a chronic cough for 14 months prior to initiation of behavioral intervention. Extensive medical treatment attempts had failed, and no organic basis for the ocugh could be demonstrated. 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. fifty-one of these represented successful avoidance responses; i.e., no cough within the critical avoidance interval. The remaining 24 trials included coughing which occurred *during* the critical interval, and punishment was administered. Finally, the boy reported no urge to cough following inhalation. The next precipitant required 60 trials to criterion, followed by 15 for the third precipitant, and, finally, only one trial for the fourth. Only five 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 (39) described earlier, had proven unsuccessful. Indeed, much of the family's life had come to revolve about "the problem." The nature of the precipitating stimuli had required considerable accommodations in the eating and toilet habits of the family—a source of almost constant family disruption and stress. Lastly, 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 six years which have elapsed since the conclusion of treatment.

Another case of chronic cough was treated by Creer, Chai, and Hoffman (16) 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, unlike the previous case (4), 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 (5mA) electric shock to his forearm each time he coughed. Dramatic results ensued. After only one shock, complete suppression of the response was attained. Three-year follow-up of this patient revealed neither recurrence of coughing nor the appearance of any other maladaptive respiratory pattern.

Recently, Alexander (In press) successfully treated a third case of chronic cough, this time in a 14-year-old asthmatic girl. Although no specific cough precipitant(s) could be identified, the baseline coughing rate, occurring

regularly at approximately 10 to 15 coughs per minute while the patient was awake, could be temporarily reduced to about 50% of usual (i.e., cough suppression) with concerted voluntary effort on the part of the patient. Hence, response-suppression shaping was employed. Following approximately 150 trials, distributed over seven sessions, complete suppression was attained. Because critical interval lengths were carefully chosen and systematically increased, only nine shocks were delivered. As of this writing, there has been no recurrence of the former inappropriate coughing (six months have elapsed since the conclusion of treatment).

The controlled clinical case reports reviewed above illustrate convincingly that behavioral methods have established a secure position in the rehabilitation treatment of children suffering from chronic asthma. Although no case reports have appeared in the behavioral literature regarding methods applied to inappropriate asthma-related behaviors in adults, no reason exists to believe that such methods should be any less useful or powerful when required in total rehabilitation programs for adult asthma patients. Indeed, Alexander and others at the National Asthma Center have implemented a variety of such techniques on a strictly clinical basis with notable but not surprising success. Reduction of asthma-related fear responses and elimination of hyperventilation are but two prime examples. We have seen that traditional behavior therapy techniques (e.g., systematic desensitization) have become the treatments of choice for reducing the fear reactions which can become so readily conditioned to stimuli associated with asthma attacks themselves or the circumstances preceding asthma episodes. It has also become clear that behavior modification techniques, based largely on the principles of operant learning, have been used with impressive reported results in the rehabilitation of asthmatic youngsters.

With the exception of the studies conducted by Khan and his associates (30, 31) and Danker et al. (21) attempting to operantly alter lung function by positive reinforcement, all of the reports just reviewed describe the application of techniques intended to affect asthma-related behaviors. In no case were the treatment attempts intended to exhibit impact on the asthma itself; in other words, there was no anticipation that either short- or long-term pulmonary physiological changes would occur. In fact, in many of the studies reported by Creer and his colleagues (13, 17, 19, 20), the failure to find changes in asthma symptomatology or pulmonary function was taken as positive evidence for the specificity of the treatment techniques employed. Such strategies represent a full appreciation of the growing acceptance by researchers and clinicians alike that psychological treatment methods in asthma should be viewed within the total rehabilitation context, and that they should rarely, if ever, be expected to alter either pathophysiological substrates in asthma or even the day-to-day manifestations of the pathophysiological processes as represented in asthma symptoms.

EVALUATION AND CONCLUSIONS

In evaluating the scientific status and therapeutic implications of the research with asthmatics discussed in the preceding sections, particularly those concerned with alteration of airways dynamics, it is of primary importance to consider the population which has been studied. In the overwhelming majority of investigations, the patients have been rather young, severely and chronically asthmatic children in residence at highly specialized treatment centers.

First, compared to adults, these children generally exhibit reduced attention span, lack of interest in procedures that adult experimenters consider important, relative inability to comprehend the rationale underlying the interventions being studied, inadequate appreciation of the potential personal therapeutic value of the investigations in which they are asked to participate, and difficulties in following complex instructions. In turn, as a direct consequence of all of these characteristics acting in concert, juvenile subjects also typically display less motivation to perform than is optimally required of subjects in successful, controlled experiments. These attributes do not constitute an indictment of asthmatic children either as children or as the victims of asthma. They are, of course, largely normal attributes, reflecting age only. Otherwise normal youngsters who suffer from asthma cannot be faulted on the grounds of a general lack of enthusiasm regarding participation in scientific experiments. Nevertheless, these features sometimes confront clinical researchers with all but insurmountable problems. By affecting the conduct of experiments, they also can substantially diminish the reliability and validity of the data gathered. Interpretation of experimental results must be made with a full appreciation of these difficulties.

Second, the children studied in the overwhelming majority of the investigations cited have been severe, chronic asthmatics, in many instances representative of the most severe asthmatics to be found. These children, as do equivalently ill adults, characteristically require large amounts of the most powerful medications, administered around the clock, not to thrive, but merely to survive. For many, discrete asthma "attacks" are infrequent because their lung functions are maintained through drugs at stable levels as close to normal as is therapeutically possible. It is not uncommon in these asthmatics to witness only extremely gradual changes in pulmonary function levels which may transpire over periods of several weeks. Frequently, these individuals are largely protected, by virtue of maintenance drug therapy, against acute episodes which might otherwise occur as a result of contact with an asthmogenic stimulus or for completely unknown reasons. It must be realized that pulmonary physiology in this population is usually difficult to alter even with pharmacologic agents as potent (and as therapeutically dangerous!) as corticosteroids. To except *behavioral* interventions of any

kind to produce clinically significant pulmonary functional changes in such patients is to expect a great deal indeed. Nevertheless, asthma researchers attempting to work with behavioral variables have found themselves doing research almost exclusively at residential treatment centers for severely asthmatic children in which carefully controlled laboratory investigations are often precluded by the many factors outlined above as well as by practical considerations: e.g., urgent therapeutic realities.

With this warning, we can now turn to the evaluation of the clinical implications of the research currently available. Behavioral intervention procedures have been applied to the treatment of asthma in three distinct ways. In the *first,* the intent is to alter pulmonary function or the manifestation of asthma symptoms more or less directly. Examples include relaxation, systematic desensitization specifically directed toward changing the salience of a presumably asthmogenic stimulus situation, and operant conditioning methods, (e.g., biofeedback of airways dynamics information). In the *second,* the primary goal is to alter maladaptive or uncomfortable emotional concomitants of asthma. Changing pulmonary function in these instances would, at best, constitute a secondary or even irrelevant goal. Systematic desensitization intended to reduce the anxiety or panic *associated* with asthma attacks is a prime example. In the *third* category, the objective is to alter maladaptive, inappropriate, or disruptive asthma-related behaviors: Here, there is no intent to alter asthma symptoms whatsoever; nor should there be. Examples include behavior modification techniques applied to malingering, developmental deficiencies, and manipulative or attention-getting behaviors such as coughing.

Attempts to alter pulmonary physiology using behavioral methods are extensively represented in the literature. The preceding review has revealed, with but the few exceptions already noted, that statistically significant increases in pulmnonary function have reportedly resulted from the application of these techniques. Such an outcome has characterized methods intended to provide immediate benefit (e.g., relaxation) as well as to yield long-term benefits (e.g., desensitization and daily relaxation practice). On the basis of these data, do we now stand prepared to recommend relaxation, airways biofeedback, and systematic desensitization techniques as constituting demonstrably useful tools in the clinical management of asthma? Despite the methodological problems (discussed earlier) inherent in many of the studies, the results at first appear convincing. Unfortunately, however, the answer must be no, or at the very best, not yet.

The primary factor precluding such investigations from providing concrete scientific support for clinical recommendations is the rather small amount of pulmonary function change evident throughout virtually all of the studies. Invariably, the lung function benefit has been less than 15%, relative to baseline. While these obtained alterations have generally been statistically

reliable, this degree of change is of very little clinical value. Benefits exceeding at least 30%, and optimally 50% to 75% or more, are required before a therapy can be considered *clinically* significant. On the one hand, controlled laboratory demonstrations that psychological interventions are capable of influencing pulmonary physiology in ways that possessed therapeutic *potential* were themselves highly important. On the other hand, the *actual* therapeutic value of these changes had, sooner or later, to be firmly substantiated for these influences to be of any but theoretical significance. Initially, it was hoped that once the existence and reliability of these effects were documented, their size could be increased to the therapeutic range purely on the basis of improved application skills. This hope was reasonable, to be sure, but has not been actualized. Especially in the case of relaxation, there is now sufficient controlled experimental data to support the conclusion that relaxation does alter pulmonary mechanics in the desired direction in severe, chronically asthmatic children, but that the amount of change obtained is of little clinical benefit. In the case of airways biofeedback and systematic desensitization therapy, the evidence is less clear. Nevertheless, the *most* optimistic conclusions that can be drawn regarding these techniques are no more encouraging than was the case for relaxation. In short, without notable exceptions the patients, primarily children, who have served as subjects in these studies have entered the experiments as severely ill, chronic asthmatics whose lung functions have been altered only slightly. They have completed their participation in our investigations only to find themselves no less *clinically* ill than when they started.

It is certainly safe to conclude that no behavioral therapeutic techniques yet employed have been found to result in clinically significant changes in pulmonary functions of severe childhood asthmatics. However, can we regard this conclusion as definitive for all asthma sufferers or even for all childhood asthmatics? Again, the answer is no. The effectiveness of these therapies has thus far been tested *only* on inpatient populations consisting of severely ill, chronic asthmatic *children.* At the beginning of this section, it was argued that such populations present very severe (perhaps, in fact, excessively severe) tests for *psychological* therapies intended to modify lung function. This argument suggests that sufficiently powerful evaluations of the ultimate clinical efficacy of behavioral methods in beneficially altering pulmonary function in asthmatics remain to be conducted. Given the reliability of changes produced in severely asthmatic patients, there is some reason to believe that individuals experiencing much less severe symptoms may benefit from behaviorally induced alteration in lung physiology at clinically significant levels. Pharmacologic effects in the lung do, in fact, approximately follow such a dose-response function in relation to severity of bronchial asthma pathology. Whether adults, or children with milder asthma, will be

found to derive some benefit from such therapies as relaxation remains, to date, a substantially uninvestigated question. Clearly, controlled laboratory experiments with both children and adults, whatever the severity of their asthma, will continue to be plagued by many of the problems delineated earlier. In sum, despite rather extensive experimental efforts, the issue of the ultimate clinical effectiveness of behavioral interventions intended to alter pulmonary function have simply not as yet been subjected to completely adequate experimental testing.

Before proceeding to the evaluation of the other behavioral techniques there is a final point to be made. The problem in asthma *is* the varying obstruction of proper air exchange in the lung. When the desire is to effect a therapeutic impact on asthma processes themselves, it is *impossible to overemphasize* the necessity of carefully and adequately measuring lung function in the evaluation of intervention outcome. For controlled experimental purposes, especially, it is definitely *not* sufficient to rely on patient report or the presence of wheezing even when assessed by stethoscopic evaluation in the hands of an experienced examiner. This is also true, of course, of investigations designed to study the precipitation of asthma. If pulmonary physiology is not directly assessed, all manner of misleading or frankly incorrect conclusions can be drawn regarding the stimuli and procedures relating to the occurrence or amelioration of asthma. Even more dangerous for the severe asthmatic, erroneous inferences regarding the proper course of treatment can result from conclusions concerning the effectiveness of any therapeutic regimen when evaluation is not based in large part on lung function analysis.

An example from our laboratory underscores this point. A child, whose asthma was thought by his physician to exhibit emotional overtones, had been experiencing increasing asthma for several days following a diagnostic antigen challenge of the lung. During one of the periods of exacerbation he was brought to our laboratory for evaluation. A good deal of subjective distress was reported by the child. Dyspnea and wheezing were obvious, and poor air exchange was evident upon stethoscopic examination. Symptomatic drug therapy was considered to be indicated. Beacause this child had been previously trained in hypnosis for other purposes, it was decided to employ brief hypnotically assisted relaxation prior to bronchodilator administration. Within ten minutes, this child was largely stethoscopically free of wheezing and reported considerable subjective relief—indeed, sufficient relief that medication treatment would thus have been deemed unnecessary at the time. We had, however, taken the "trouble" to obtain spirometric measurement of lung function both before and after relaxation. The results of this assessment indicated severe air flow obstruction, especially in the small airways, prior to relaxation and absolutely no change in measured function immediately

following the relaxation treatment. Despite temporary subjective relief, this boy's lung function continued to deteriorate and drug treatment was needed shortly thereafter.

This example does not constitute an instance of pulmonary anomaly. It is entirely within the realm of physiological possibility: Some modest and short-lived degree of large airway improvement accounting for both the subjective benefit and the stethoscopically assessed status. All too frequently, asthma sufferers come to emergency rooms in the throes of acute episodes only to be told to just sit down, relax, and be calm, the (completely erroneous) assumption being that the obvious agitation and anxiety are the cause rather than the result of the acute airway obstruction. If some subjective benefit results, as it may, and the individual is sent home without benefit of lung function measurement following either minimal, inadequate, or no other treatment, he or she could experience critically exacerbated symptoms in a short time. Suffice it to say that similar circumstances in a clinical outcome investigation or an anecdotal case report, if pulmonary physiology is not measured, would support conclusions that are very much out of line with reality. It it best to respectfully reserve judgment on reports of experiments concerning asthma if lung function measurements are not included.

Even when adequate pulmonary function measurement is employed, however, outcome interpretation problems remain especially when one is evaluating the possibility of long-term therapeutic gains. The frequency, amount, and kind of necessary regular medications must certainly be considered. Treatment benefit, or the lack thereof, may be evident only by comparing lung physiology data with medication requirements. Reduced needs for medication in the face of unchanged lung function can indicate a significant clinical benefit just as much as increased pulmonary function when pharmacological variables are held constant. But, if dose quantity or type of medication is allowed to vary during intervention and/or postassessment periods, meaningful conclusions regarding pulmonary physiology in relation to the procedure under test are almost impossible except when frequency and type of dosage change *only* in the direction of decreased pharmacologic potency. To complicate the picture still further, the presence or absence of treatment effects may become manifest as alterations in the frequency, duration, or severity of discrete asthmatic episodes when contrasted with medication and pulmonary function levels. Valid and reliable assessment of the clinical consequences of psychological treatment methods or laboratory procedures, however, is very problematic, often involving almost hopelessly subjective judgments using criteria that may be next to impossible to establish. To operationally define, for scientific purposes, whether or not an "attack" has occurred, let alone its duration and intensity, can seem to virtually defy accomplishment. Both the design and interpretation of asthma

treatment investigations must not only directly confront but also surmount these difficulties if worthwhile data are the desired result.

Up to this point, we have been considering behavioral techniques intended to therapeutically alter lung function in asthma. The second category of behavioral interventions discussed attempts to effect changes in the emotional concomitants of asthma, the primary example being anxiety or fear associated with asthma. In these instances no assumption typically exists that emotional reactions lead, in a causal sense, to asthma attacks. In fact, the opposite is the case: Stimuli associated with asthma (e.g., tightness and wheezing) are presumed to have become classically conditioned "trigger" stimuli which set the occasion for fear and anxiety responses. Such responses can, for all practical purposes, be considered to be *bona fide* phobic (i.e., classically conditioned) maladaptive reactions. These conditioned emotional responses can develop as the direct consequence of extremely frightening, life-threatening episodes, where the fear may result from severe dyspnea and hypoxia, the anxious and fearful reactions of family members, physicians, nurses, and other medical personnel, during acute attacks, and the pain associated with treatment (e.g., venous and arterial punctures), among other salient features characteristic of such medical crises. These untoward reactions often make treating the patient difficult and can thus exacerbate and prolong the attack itself, not to speak of the increased discomfort, both psychological and physical, for the patient.

During the past 15 years or so, it has become clearly evident that any of the deconditioning behavior therapies (for example, systematic desensitization or implosion) are the treatments of choice for clinical phobias in both adults and children. There is every reason to believe that fear associated with asthma (called "asthma panic") should be completely amenable to treatment by behavior therapy. This seems in fact to be the case. Over the past decade, numerous cases of asthma panic in youngsters, and several in adults, have been successfully treated at the National Asthma Center, and probably elsewhere, with systematic desensitization and its variants (e.g., *in vivo* desensitization and emotive imagery), and implosion (flooding). In these cases there was generally no intention of altering lung function, and the success of treatment (i.e., reduced anxiety) was judged solely on such clinical criteria as subjective reports of improvement by the patient, nurses, physicians, and others involved in the care and management of the individuals treated.

An interesting example of this intervention strategy is provided by the case of a child recently treated in our laboratory. This six-year-old boy was reported to be experiencing anxiety whenever he wheezed, even mildly, but not when just talking or thinking about asthma. Anxiety appeared to occur roughly in proportion to the severity of bronchospasm. Age seemed to

preclude standard image desensitization, and an *in vivo* method was selected. Progressively more severe wheezing was manipualted by withholding regular oral bronchodilators for successively longer periods preceding each treatment session. During these sessions the boy and the therapist engaged in pleasant, "relaxing" activities (e.g., drawing and the like) for 20 minutes. The stimulus value of the situation was enhanced by conducting the sessions in a medical treatment atmosphere replete with all of the traditional trappings. Only six sessions were required to reduce this boy's fear to the point where medical personnel reported a marked, beneficial decrease in panic behavior during subsequent naturally occurring asthma episodes.

The reasons why outcome has been assessed strictly on the basis of clinical judgment in these cases are undoubtedly related to the explanation of why there are no controlled reports in the literature, experimental or otherwise, on the application of behavior therapy methods to reducing fear behavior in asthmatic children. Asthma panic does not yield to measurement in a straightforward, uncomplicated fashion. First, it does not lend itself to assessment by such techniques as the behavioral avoidance tests so frequently employed in experimental studies of small-animal phobias. Second, subjective assessments by the patient are out of the question at times when he or she may be struggling for life. Third, objective observational assessment (for example, by means of the commonly used fear behavior checklists) is also difficult to employ due to the wide range of behaviors through which asthma panic becomes manifest. The behavior of highly fearful patients during asthma attacks may range from postural freezing to extreme agitation accompanied by crying, screaming, and flailing of limbs, as well as by active attempts to interfere with necessary treatment procedures such as arterial or venous insertions. Fourth, treatment outcome can typically only be assessed during periods of naturally occurring, *severe* asthma attacks. These may, and generally do, occur relatively infrequently and at unpredictable times. Attemps to study the phenomenon in the laboratory are virtually impossible on both practical and ethical grounds. At the National Asthma Center, several attemps to provide controlled case study examples of this clearly effective treatment method for purposes of publication have ended in frustration, even in the face of manifestly successful treatment. At this point it can be concluded, largely on the basis of clinical experience, that any of the standard deconditioning behavior therapies is the treatment of choice for asthma panic. This recommendation is supported by convincing experimental and controlled case report data from the successful application of these same techniques to a variety of other clinical fears and anxieties.

The third and final example of behaviorally based treatment strategies employed with asthmatics are those intended to alter or control behavioral excesses and/or deficits. The kinds of problems to which these methods are applied are only coincidentally associated with asthma *per se*. That is,

inappropriate behavior patterns (e.g., malingering or poor social development) are not specific to asthma and can occur in conjunction with any chronic disease or, indeed, simply in the course of growing up. It hardly needs to be pointed out that the existence of a chronic disorder in a child can considerably increase the probability of developmental behavior difficulties, although their appearance is certainly neither ensured by, nor exclusive to, the presence of the chronic physical disease or handicap.

The review of the applications of various behavior modification techniques presented previously makes it obvious that these methods have been eminently successful when applied to common behavioral problems occurring in childhood asthmatics. There is nothing remarkable in this state of affairs. The overall effectiveness of behavior modification procedures in dealing with an impressively wide range of behavior problems in children, whether in normal youngsters or in those afflicted with a chronic illness, is exceedingly well documented in the applied behavior analysis literature generally. The recommendation to apply behavior modification methods to such problems in asthmatic children is supported by the full weight of this literature, and thus behavioral methods overwhelmingly constitute the treatments of choice for childhood behavioral problems occurring as a result of, or coincident with, asthma or any other chronic disease. Although reports in the literature of the application of these methods with asthmatics have dealt exclusively with children, there is no reason to believe that behavior modification techniques should enjoy less success when appropriately applied to the asthma-related problems of adult asthma sufferers.

In summary, we have seen that the role of psychological variables and treatment methods in the area of asthma has shifted markedly. The past has been characterized by a concerted effort to generate empirical support for the assumption that psychological factors were intimately involved in the development and manifestation of asthma symptoms. Abundant evidence now firmly suggests that psychological variables do not occupy such a position: In all likelihood asthma should not be considered a *psychological disorder* in any important sense. Though the answers are not all in, psychological influence in lung function appears minimal at best, and no convincing evidence of conditioned bronchospasm has been forthcoming despite historically strong belief in its existence. Correspondingly, psychological treatment methods intended to alter lung physiology or provide therapeutic relief from asthma symptoms have, not surprisingly, failed to materalize as viable therapies for asthma.

As the air has become cleared of these burdensome notions, a new focus should take shape. We are beginning to fully appreciate that asthma, like all chronic physical disorders, has profound psychological *consequences,* a realization that moves behavioral difficulties soundly in the direction of the result rather than the cause of asthma. As researchers and clinicians alike

grow more comfortable with this new role for psychological factors in asthma, it is becoming apparent that this role is no less significant than when psychologic variables were thought to occupy a pivotal position in the etiology of asthma. In retrospect, it is alarming to consider the countless patients who have been shamelessly beleaguered by the widely held belief that their asthma was largely "in their heads" rather than their lungs. They have been shipped off to mental health professionals only to find insufficient relief and little understanding of their real psychological or physical problems. Asthma requires, first and foremost, knowledgeable medical therapy and, for many victims, equally sophisticated behavioral intervention.

Psychological assistance, for both adults and children, should have rehabilitation as its fundamental rationale. Research has clearly suggested that psychological treatment methods, in particular those based on behavioral principles, can provide the kind of benefit required by those suffering from such chronic illnesses as asthma. The critical factor is the abandonment of the erroneous belief that behavioral treatments should be expected to exhibit clinical impact on asthma *qua* asthma. Free of this misconception, therapy for asthma should, and can, be freshly viewed as a total physical and psychological rehabilitative effort in proportions rationally tailored to the specific needs of the individual patient.

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Introduction to The Gastrointestinal System (Including Eating Disorders)

The gastrointestinal system is the focus of more disease syndromes than any other portion of the body. Problems of food palatability, indigestion, gastric, biliary, and ulcer disease, colitis, and elimination disorders encompass a large part of traditional psychosomatic medicine. Unfortunately, little behavioral research has focused on treating these problems. Rather, the focus of research in this area, and the emphasis in this section, is on weight and disorders of elimination. Our inclusion of weight as a gastrointestinal disorder is admittedly arbitrary. In fact, there is little evidence that would support its position in this section rather than with chapters on the central nervous system, psychoneuroendocrinology, or addictive behaviors.

Disorders of weight are intriguing to the behavioral scientist for several reasons. For many, these syndromes provide a dependent variable with 100% interobserver reliability, which is easily measured, and an associated set of precisely specifiable behaviors which can serve as independent variables in experimental paradigms. It is an area of medical and behavioral concern that, prior to the innovation of behavioral techniques, was quite resistant to change. The clinical need for effective treatment is well proven, and the medical consequences of obesity have been demonstrated innumerable times: Significant excess weight increases the morbidity and mortality from every known disease process. Despite this known effect, medicine does not do well in treating obesity, and many patients are caught up in a repeating pattern of crash weight loss through diet pills and starvation followed by weight gain—the "rhythm method of girth control"—as Jean Mayer has colorfully called it (7).

Much of the behavioral literature has been based on the initial *postulate* of Ferster et al. (4) that there is a difference in the eating style of obese and nonobese individuals, and that eating style is learned. Although several studies have failed to demonstrate this difference in eating style between adult obese and nonobese subjects (1), the programs based on Ferster's postulates are effective.

Most treatment programs for obesity are based on the simple model that an individual who consumes more calories than they utilize in the average day will become overweight. The behavioral literature has concerned itself largely with the habits that lead to excess caloric intake or inadequate caloric expenditure. There are, however, a wide variety of additional factors that influence both fat metabolism and body size, including genetic predisposition (2, 7), age of onset (10), structural (14) and biochemical (11) lesions of the central nervous system, hormone disturbances (5, 12), neuropeptide abnormalities (8), stress (9), and response to food palatability (6).

In both animals and humans, the signals for hunger and satiety remain unknown. Behaviorally, we have worked largely with the environment to change caloric intake, but may have been inadvertently effecting any of the above control mechanisms. Clearly when this many contributing factors can be specified for a disease syndrome, a syndrome taxonomy is in order. For example, one might separate patients with lipogenic, behavioral, genetic, hypertrophic-hyperplastic, and boredom-induced obesity, and design a behavioral program appropriate to each.

In the first paper in this section, Jeffrey points out some of the economic and societal factors involved in the problem of obesity. His analysis of health problems and their relationship to both excess weight and nutritional intake is startling. To date there have been few macroenvironmental programs developed to attack this problem.

In the next chapter Hagen reviews the behavioral research on adult obesity. Although the first studies of behavioral weight control were not impressive, Stuart's subsequent interventions (13) suggested great possibilities for behavioral control. Many variations of Stuart's original program have appeared and been applied to a wide variety of populations by a wide variety of therapists. Although few people have equalled Stuart's initial positive results, behavioral programs have been found to be consistently effective in the short run. Unfortunately, the effects tend to disappear over time. Because of the long period of time needed to carry out studies on behavioral maintenance techniques, the literature in this area is sparse. Hall et al. discuss this problem in detail in Volume 3 of this Handbook, Chapter 7.

Behavioral studies of obesity have provided a model for testing a variety of behavioral interventions—for example, types of therapists, therapeutic settings, therapeutic meeting frequency, contingent refunds, and positive vs. negative reinforcement. Hagen reviews many of these in detail; for example, for the problem of obesity it appears that therapist contact does not have to be

intense, that "minimally" trained therapists appear to do as well as highly trained therapists, and that bibliotherapy may provide an alternative to costly personal therapeutic intervention.

Unlike adults, normal and obese children may have significantly different eating styles. Drabman explores the eating behaviors of children and points out that these differences among thin and overweight children may be seen in some infants during the first day of life, prior to any possible postnatal learning. He points out that differences in eating behaviors may be present but modifiable at birth, but may stabilize with increasing age. To date, a program has not been developed to change the eating behaviors of children, but clearly the data indicate that such change may be possible. Prior to the overlay of social behaviors with increasing age, eating behaviors in this age group may be far simpler and less overdetermined than in the older person.

In the next chapter on adolescent obesity, Coates and Thoresen ask a disturbing question, "Is there any hope?" They note the particular difficulties of achieving weight loss in overweight adolescents with traditional behavioral change techniques. Their experimental program is based on social learning theory principles with the assumption that eating is influenced by events in the immediate physical and social environment. They used single-subject designs with a series of adolescent girls to examine different treatment approaches. Their individual problem-solving program, which involved the entire family, seemed effective in producing short-term changes in eating and exercise behaviors as well as weight change. To examine the effective factors more intensely, they used a group study design incorporating the same therapeutic principles. In this second study, their results were less than hoped for. They posed the question: Was this due to a failure to incorporate sufficient environmental support into their treatment package? A second group study used behavioral contracts for weight loss and habit change, and resulted in impressive weight loss.

Three chapters elsewhere in this Handbook are directly relevant to a discussion of obesity. Yates (Volume 3, Chapter 8) describes a cost-effective/cost-utility analysis of treatment procedures for obesity and uses weight reduction programs as an example of how cost-effectiveness can be calculated. Nash and Farquhar (Volume 3, Chapter 14) report the results of their three-community study of intensive instruction, including nutritional information, with and without intensive media advertising, compared with a control community. Their dependent variables included cardiovascular risk factors and obesity. The results of this study are extremely important when one considers the public health consequences of making large risk factor changes. Wing and Epstein (Volume 1, Chapter 7) discuss some of the implications of exercise on weight.

On the other end of the weight continuum are individuals who are too thin. Curiously, the behavioral literature has concentrated only on the pathological condition of anorexia nervosa, with no published research

available on simple anorexia, or treatment programs for individuals who are too thin but without signs of psychopathology.

The treatment of anorexia has stimulated considerable research. Ferguson describes the history of this disorder and much of the experimental work which has provided the basis for a comprehensive treatment program. As with obesity, the long-term outlook is somewhat less encouraging than the immediate results. Although to date there has not been a controlled comparative group outcome study, research centers where individuals have been nonrandomly assigned to behavioral, nutritional-nursing, or psychotherapeutic treatment modalities have found little outcome difference at follow-up. However, this may speak less to the issue of behavior modification for anorexia nervosa than to the inadequacy of follow-up programs. Finally, as with obesity, the biological basis for anorexia nervosa has not been clearly specified. A large body of scientific investigation has demonstrated that the hypothalamus is intimately involved in the regulation of weight and appetite, and that its function is severely disturbed in these patients. More recently short-chain polypeptides have been implicated in the maintenance of this disorder (8).

Doleys discusses encopresis, another common gastrointestinal disorder more prevalent in children than in adults. He defines the underlying physiology of defecation and the varieties of disturbance in this system, and stresses the need for careful medical and behavioral assessment. Treatments have varied from the use of laxatives to diapering: He urges a multimodal approach beginning with positive reinforcement for induced bowel movements if necessary, and progressing to token reinforcements for maintenance of clean pants.

This section concludes with a brief review of the behavioral approaches to other gastrointestinal disorders. The use of biofeedback to treat fecal incontinence and other "sphincter" disorders is a major contribution from the area of behavioral medicine. These highly embarassing disorders previously could be treated only by diapering, a procedure quite humiliating for an adult. Other gastrointestinal disorders have been approached in single case studies and need to be further pursued. For example, the effects of operant conditioning on gastric function, bowel sound feedback to decrease intestinal motility, and relaxation and related techniques to decrease gastric motility.

We have not included a section on nutrition in this chapter or elsewhere because so little behavioral research has been done in this area. The attractiveness of weight as a variable may have inadvertently led us to neglect the equally, if not more, important area of nutrition. And yet, the average American diet is hazardous to our health. A few preliminary studies have shown that behavioral techniques show promise in changing eating habits. One program resulted in a significant reduction (greater than 25%) in serum cholesterol levels in individuals by using stimulus control techniques and

media plus intensive instruction and encouragement in diet change in Volume 3, Chapter 14. The area of nutrition is in desperate need of study by behavioral researchers.

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CHAPTER 2

Diet, Exercise, Obesity, and Related Health Problems: A Macroenvironmental Analysis

D. Balfour Jeffrey
Nancy Lemnitzer

Over 70 million Americans are overweight and that number increases yearly (21, 43).* In other Western countries, approximately one out of three persons is obese. In addition, about 25% of America's children are overweight, and about 80% of all obese children grow up to become obese adults (12, 29). The proportion of overweight people appears to be higher now than it has ever been.

The increase in obesity greatly concerns health professionals, as research has established that it is associated with a number of health risks and costs (12, 30, 47). Mayer (30) suggests that maladies of almost every body function occur more frequently among obese persons than among normal-weight persons. Six of the ten leading causes of death in the United States have been connected to diet—heart disease, stroke, cancer, diabetes, arteriosclerosis, and cirrhosis of the liver. Most of these conditions are related to obesity and an excessive intake of fat and sugar (31).

People who are overweight have a higher incidence of cardiovascular diseases (14, 47), such as arteriosclerosis, heart disease, strokes, hypertension, and varicose veins. There is an increase of 30% in susceptibility to these diseases for every 10% increase above ideal weight. More than 27 million persons in the country are afflicted with some form of cardiovascular disease, and they cause over one million deaths (54% of all deaths) each year (16).

Those who are overweight have a higher incidence of respiratory difficulties with less exercise tolerance, greater difficulty in normal breathing, and a higher incidence of respiratory infections than do people of normal

*Portions of this chapter are based on earlier work (22). Reprints and other information related to the behavioral management of obesity may be obtained from D. Balfour Jeffrey, Department of Psychology, University of Montana, Missoula, Montana 59812.

weight. Overweight people also have frequent problems with skeletal-joint systems, such as arthritis, back pain, and hip, knee, and ankle difficulties (24). Furthermore, research has indicated that obese people may suffer more from problems such as constipation, hernia, hemorrhoids, gall bladder diseases, and diabetes (46). Obesity has even been connected to cancer of the breast and colon (17), and of the womb and kidneys (49).

In addition to the higher incidence of medical problems, overweight people often have psychological problems, such as extreme self-consciousness, poor self-image, depression, and poor interpersonal relationships. For example, obese girls have been found to be more passive and to have an excessive concern with self-image, to expect rejection and therefore to isolate themselves from social contact (7, 33). Research suggests that overweight children may feel inadequate, doubt their own worth, and become shy and socially isolated (12, 24).

Furthermore, obesity has economic costs. A marketing survey indicated that a staggering $10 billion are spent annually on various dietary foods, medications, devices, and programs (46). In testimony before the U.S. Senate Select Committee on Nutrition, Dr. George Briggs (6) stated that the nation's staggering $200 billion health care bill, which could exceed $250 billion by 1980, is directly related to the nation's food preferences. He estimated that improved nutrition might cut the nation's health bill by one-third.

The ultimate health risk of obesity is, of course, early death. Armstrong (4) contrasted the mortality rates of overweight and normal-weight individuals. He found the mortality rate to be 70% higher for men markedly overweight and 42% higher for men moderately overweight; for women, the rates were 61% and 42% respectively.

While obesity is clearly connected with numerous health risks, there are also indications that even normal-weight people who consume high percentages of sugar and fat risk developing these same health problems. For instance, high ingestion of sugar has been connected with diabetes (11, 30, 47), gastric ulcers, and dyspepsia (50), tooth decay (which may be the most widespread disease related to nutrition), and peridental gum and bone disease (38). It may aid in the depositing of fat on arterial walls, leading to arteriosclerosis, and it has been found to have many effects on metabolism which could cause problems such as a reduction in growth rate, a shortening of life span, interference with protein utilization, reduction of glucose tolerance, increases in concentration of certain hormones in the blood, increases in the amount of fat in the liver, and increases in the size of the liver and kidney (50). Foods high in sugar are usually low in vitamins and minerals; moreover, they decrease the appetite for foods high in vitamins and minerals. The resultant deficit may be linked to alimentary cancer, thyroid cancer, and cancer of the uterus and kidneys (49).

High ingestion of fat, especially animal fat such as in beef, eggs, or dairy products, even in normal-weight people, is significantly connected with

elevated levels of serum cholesterol and triglycerides, which research suggests may lead to arteriosclerosis and heart disease. Other risk factors are of womb cancer, high blood pressure, and hormone imbalances (3, 47).

An excessive intake of salt (in potato chips, cured meats, etc.) has been found to cause an increase in blood pressure, hypertension, gastric acid secretion, stomach cancer, and migraine headaches (5, 32).

An analysis of eating patterns and obesity of individuals can occur at two levels—micro and macro. At a microlevel, the analysis and treatment is focused on the eating, exercise, and psychological patterns of the individual. Most behavioral and traditional research (e.g., 1, 7, 20, 23, 45) has focused on a microanalysis—treating individual obese patients. Such approaches continue to add to the understanding and treatment of obesity.

The other level of work consists of a macroanalysis. This focuses on the total society and how it facilitates or impedes good eating habits, physical activity habits, and weight management. Such an analysis could suggest ways that large segments of the population might come to change their eating habits, ways to treat whole classes of medical problems. In short, it might expand the scope of treatment away from the single patient toward prevention and treatment at a societal level.

The focus of this chapter will be on the macroenvironmental determinants of eating behavior, exercise habits, and obesity. Based on this macroanalysis, proposals will then be presented to improve our eating habits, physical activity habits, and weight management at the societal level.

SOCIAL LEARNING THEORY, EATING HABITS AND PHYSICAL ACTIVITY

Social learning theory focuses on the acquisition and maintenance of behaviors due to environmental factors. Classical conditioning, operant conditioning, and imitation learning principles are included in this theory of behavior. Since our eating and physical activity habits, good or bad, are acquired patterns of behavior, social learning theory provides an excellent model for analyzing how these behaviors are acquired and maintained. A few examples of how these learning principles may function in obesity are provided.

There are many ways that one learns about food. Children often observe and imitate their parents' eating behavior, and they may be reinforced for engaging in the same style of eating. They learn specific attitudes about foods or eating, including misconceptions about nutrition. Members of our society learn through conditioning principles to associate food and eating with social occasions, fun, and self-gratification. Some people may learn to use food as an escape from tension or boredom, or to assuage hurt or depression. In the same way, attitudes and behaviors toward physical exercise are acquired.

Parents may model physical inactivity and *not* reward active participation in sports. The child may learn that it is less effort to be driven to school than to walk. He may notice his parents' or siblings' preoccupation with mechanical labor-saving devices and preference for spectator rather than participant sports. He may learn that school athletics is only for the sports stars, since those who do not excel are not reinforced. (See Jeffrey and Katz [24] for a more detailed discussion of how individuals learn various eating and physical activity habits.)

While these examples illustrate how learning principles are involved in the immediate home environment to influence the development of good or poor eating and physical activity habits, these same principles are also involved at the societal level to influence the development of eating and exercise habits. The next section examines the acquisition of eating habits at the societal level.

A MACROANALYSIS OF EATING HABITS

Changes in America in the last 30 years have created a food and energy revolution. Agricultural abundance, mechanization of food processing, expansion of television food advertising, mechanization in the work world, and the explosion of spectator sports have changed the entire fabric of American dietary and physical activity habits. America has gone from a three-meal-a-day, meat-and-potatoes diet to one of fast foods at chain restaurants and in-between-meal snacking and nibbling. From 1962 to 1968 our consumption of cake as a snack food increased by 70%. Snacking of cookies was up by 40%; curls, chips, and nuts was up 63.2%; and chocolate candy was up 46.5%. Per capita consumption of cookies increased from 1.72 lbs to 11.92 lbs per year and of candies from 2.15 lbs to 17.54 lbs per year (35).

Perhaps the most powerful of the changes in our society in terms of its influence on eating behaviors is advertising in general and television advertising in particular. The hours of exposure to television are well documented. Ninety-six percent of the American population have television sets in their homes. Children under five watch an average of 23.5 hours of television a week. The average viewer under 12 watches 25 hours and 38 minutes a week. This means that in one year an average child will watch over 1,000 hours, and by high school graduation the typical teenager will have logged at least 15,000 hours before the screen—more time than he will have spent on any other activity except sleep (43). Lest it appear that children do all the watching, adult women watch an average of 30 hours and 14 minutes a week and adult men, 24 hours and 25 minutes a week (37).

Since World War II, the largest expenditure for public information on diet in the United States has been made by the food industry for TV advertising. In 1975, according to Leading National Advertisers (25), about $1.15 billion was

spent on television food advertising, which represents about 28% of total television advertising spending (47).

Manoff (27), speaking to the 9th International Congress on Nutrition, suggests that more than 50% of the money spent on television food advertising may be negatively related to health. His calculations show that a minimum of 48% of the money spent on television food advertising in 1971 went for items that may be generally characterized as high in fat, saturated fat, cholesterol, sugar, salt, or alcohol. This, he feels, is a conservative estimate, not including sugared cereals and certain cake mixes, meat products, eggs, butter, and cheeses that may be high in one or more of the dietary risk factors.

Masover and Stamler (28) report a study of food advertising on four Chicago television stations. They found that almost 70% of the time was devoted to advertising promoting food generally high in fat, saturated fat, cholesterol, sugar, and/or salt, and that only 3% of the time was devoted to fruit and vegetables, and 0.7% was devoted to fresh fruit and juices. Fish, seafood, and poultry received about the same advertising exposure as beef—about 3.2%. They found an even less healthful balance of weekend food advertising, in which about 85% of the time was devoted to foods high in fat, saturated fat, cholesterol, sugar, and/or salt. During the sample weekend period, no advertising time was given to fresh fruit or vegetables.

The New York State Assembly, studying TV advertising in New York State (29), found that food products, fast food restaurants, and other edibles made up close to 80% of all the advertisements broadcast. They found that the mix of food products advertised on children's (age 11 or younger) programs was even more limited than that advertised on television generally. Their results appear below:

	Number of Commercials	Percent of Commercials
Cereals	3832	46.8
Candy and gum	1627	39.8
Cookies and crackers	841	39.5
Meat and poultry	2	0.0
Vegetables	1	0.0
Cheese	1	0.0

The New York State Assembly project and other studies have found that sugared edibles consistently represent more than one-half of all advertising to children, and more than two-thirds of all commercial announcements for edibles.

By the time the average child enters kindergarten, he will have seen approximately 70,000 such commercials. The influence of television

advertising for high-calorie food is even more pronounced when we consider the amount of available nutrition information that could serve to counter the effect. Too many commercials emphasize sugar as a source of quick energy, and children may believe that sugar is the only nutrient they need. The child hardly ever sees anyone on TV talking favorably about meat, eggs, fruit, or vegetables. In addition, snacking and immediate gratification of desire for food is encouraged. This is coupled with a lack of information on the dangers of obesity and the need for proper nutrition (29).

If pro-nutritional television announcements are rare and dwarfed by the number of low-nutrition messages, nutritional messages from other sources do not fare much better. Many adults know little about nutritious eating. Primary and secondary schools rarely offer a regular curriculum on nutrition; moreover, most teachers have had little exposure to the basic facts about good nutrition. And what children learn about food from these early sources is likely to have an impact on lifelong eating habits.

Masover and Stamler (28) conclude that television is the principal source of nutrition information for Americans and a powerful influence on their eating habits. They state:

> When this outlay of food advertising is juxtaposed with what is known about the prevalence in the United States of malnutrition of both the under and over-nutrition types, coronary heart disease, hypertension, diabetes, and alcoholic liver cirrhosis, it is reasonable to conclude that on weekdays over 70 percent and on weekends over 85 percent is negatively related to the nation's health needs.

Furthermore, they say:

> Television is the primary source of information for the American public today. On the other hand, positive nutrition education from other sources is comparatively minuscule. Thus, it is reasonable to infer further that these combined circumstances are significant contributors to the current array of nutrition-related health problems.

A MACROENVIRONMENTAL ANALYSIS OF PHYSICAL ACTIVITY HABITS

In America today the ordinary tasks of daily living no longer provide enough vigorous exercise to develop and maintain good muscle tone or cardiovascular and respiratory fitness. In homes and factories, and even on farms, machines now supply the "muscle power" for most jobs, virtually eliminating the necessity for walking, climbing stairs, and lifting. For instance, the car has caused a major reduction in our energy expenditure. People drive to work, to school, to the store, to the theater, to the bank, to see friends; in fact, almost everywhere. This is coupled with a dramatic increase in

spectator as opposed to participant sports—the most pervasive of which is watching TV. Even popular sports that require direct participation (e.g., golf) have been affected (e.g., the golf cart).

Widespread physical inactivity, together with poor living habits, have resulted in a national fitness problem. The nation's children do poorly on tests of strength and endurance. Education's continuing financial crisis and the trend away from required subjects has resulted in the loss of many physical education programs. A simultaneous trend toward "elective" physical education often results in students' taking courses that contribute little to fitness or progressive skills development. Fifty million adult Americans never engage in physical activity for exercise; and 54% of all deaths in the United States result from diseases that can be, in part, attributed to lack of exercise (e.g., heart disease, cardiovascular problems) (41).

Several researchers have suggested that exercise rather than diet is the critical variable in obesity. Mayer (30) found with high school girls that relative inactivity was a more important factor than relative overeating in the development of obesity in the subjects; and that the girls who were the most obese ate slightly less than the normal-weight girls, but exercised considerably less. In a study with babies, Mayer (30) found that there was no correlation between fatness and food intake, nor between growth and intake, but a marked correlation between physical activity and intake. Fat babies had small-to-moderate intakes, but were very inactive. Very thin babies were very active and had large food intakes. Mayer concludes that perpetuation of inactivity may mean perpetuation of a physique fatter than average; in short, obesity. In his words, "I am convinced that inactivity is the most important factor explaining the frequency of 'creeping' overweight in modern societies."

In a more recent study, Nelson (36) came to a similar conclusion. He found, in a study with 1900 children aged 6 to 15, that there was no significant difference in the caloric intakes of children classified as thin, obese, or muscular. Rather, exercise was the critical factor. Obese children were found to exercise less than normal-weight children, and the obese children were found to lose weight when they were subjected to a daily jogging program.

Paffenberger (39), in a study of 17,000 Harvard alumni aged 35 to 75, found that there were fewer heart attacks among those who engaged regularly in strenuous sports activities, expending 2000 or more calories per week. Furthermore, at each level of caloric expenditure, the risk of heart attack was lower with strenuous sports than with more casual activities. Thus, for instance, men who played squash were better off than those who walked, even though both used up the same number of calories. The study showed that lower amounts of physical activity had *no* measurable benefit in terms of reducing risk of heart attack. Those expending less than 2000 calories per week were found to have a 64% higher risk of heart attack than their more energetic classmates. Paffenberger concluded that if all the men had been on

the high side of the index, 166 fewer heart attacks would have occurred in the study period.

Other studies have shown that obese persons without caloric restriction significantly decreased body fat and weight, and increased lean body mass through exercise, while control groups with neither caloric restriction nor exercise failed to show weight or fat changes. Authors were careful to conclude, however, that exercise with dietary regulation is the most desirable approach to fat reduction (10).

Studies of the effect of diet and increased exercise often show dramatic changes in weight loss, cholesterol count, and other health indices. For instance, Clarke (10) reports on the treatment of cardiovascular disease through diet and walking over a six-month period. The experimental group was restricted to a diet with 10% protein, 10% fat, and 80% complex carbohydrates. The control group ate a diet consisting of 20% protein, 40% fat, and 40% carbohydrates. Both groups were advised and encouraged to walk daily as much as they could. Diseases of patients in the experimental group improved as follows: 100% of cases of angina, diabetes, gout, arthritis, and elevated blood lipids; 75% of those involving hypertension; and 50% or more of those involving congestive heart failure. However, an operational definition of "improvement" was not provided, nor was data on changes in the control group. These findings need to be replicated and more systematically reported, but they suggested the important role of diet *and* exercise in treating obesity and many associated diseases.

Summary

Personal food preferences interact with other forces in the environment and are influenced by them. People learn the patterns of their diet, not only from the family and its sociocultural background, but from what is available in the marketplace, and what is promoted formally through advertising and informally through general availability in schools, restaurants, supermarkets, workplaces, and airports. Physical activity habits are acquired and affected in similar sociocultural ways. Given this macroenvironmental analysis, the question then becomes: How do we increase good eating and physical activity habits? Or conversely: How do we decrease poor eating and physical activity habits? What do we know about learning principles and behavior modification that we can apply at a societal level? The remaining sections of this chapter will try to provide some answers to these questions.

PROPOSALS FOR INCREASING GOOD EATING BEHAVIORS

Before making any specific proposals, let us make an assumption for the sake of this discussion that our political leaders and the public said to the

behaviorists, "Here is a mandate to improve our eating patterns, physical activity, and weight management. Do whatever you need to do." Following are a number of proposals designed to modify the eating habits and physical activity habits of millions of people at a societal level. These proposals are by no means comprehensive, nor are they without their difficulties, but it is hoped they will stimulate us to start thinking of behavior modification programs at this level of analysis and intervention.

Establish National Dietary Goals

The public is confused about what to eat to maximize health. Public policymakers could be of considerable help in changing public awareness about food. This could be achieved through the adoption and implementation of national dietary goals that would provide a simple guide to good eating habits and encourage a healthful selection of foods. Such goals would also facilitate government and industry decisions regarding the nutritional information provided to the public, the kinds of foods produced, and how foods are processed and advertised.

The U.S. Senate Select Committee on Nutrition and Human Needs (47) has studied this area extensively and has offered suggested dietary goals. Based on expert testimony presented to the Select Committee, guidelines established by governmental and professional bodies in the United States and at least eight other nations, the Select Committee recommends:

1. That consumption of fruits, vegetables, and whole grains be increased;
2. That consumption of fatty meat be decreased and fish and poultry be increased;
3. That consumption of foods high in fat be decreased and that polyunsaturated fat be substituted for saturated fat;
4. That nonfat milk be substituted for whole milk;
5. That consumption of butterfat, eggs, and other high cholesterol sources be decreased;
6. That consumption of sugar and foods high in sugar content be decreased;
7. That consumption of salt and foods high in salt content be decreased.

These guidelines are sensible and reasonable and should be adopted and implemented.

Improve Nutrition Education Programs

We need to improve the dissemination of information about good nutrition, eating habits, and weight control to health professionals, to

elementary and secondary school teachers, and to the public. Several pilot programs around the nation are attempting to achieve this.

Baylor College of Medicine in Houston, funded by a five-year grant from the National Heart and Lung Institute of NIH, has been attempting to demonstrate the effectiveness of community diet education programs for lowering plasma cholesterol and triglyceride levels in the general population. Based on the Framington study, which suggests that a 10% reduction in serum cholesterol levels of the population would yield a 23% decrease in the incidence of heart disease, the program uses both nutritional and behavioral information. A total of 1000 individuals are expected to participate in a three-year period. The project also works with the Texas Agricultural Extension Service of Texas A & M in developing monthly programs on nutrition and home economics for low-income families. Nutrition education is conducted by neighborhood aides through home visits. An estimated population of 25,000 is reached (16).

The University of Oregon Health Sciences Center has developed a similar program involving a sample of 200 families in metropolitan Portland (13). The program is attempting to determine the acceptance and use of a diet known to maximally lower cholesterol and triglyceride levels. Called the "alternative diet," the program is geared toward providing the members of the participating families the opportunity to change the way they eat: (a) By providing them with scientific evidence about the current American diet and its connection with heart disease and other nutritionally related diseases; (b) by providing them with information about the practical means to make changes in eating and physical activity habits; and (c) by using known behavioral techniques to aid them in making dietary changes. The unique aspects of this program are the focus on the family unit, on populations with no known pathological medical diagnoses, on a gradual, noncoercive educational approach, and on a diet compatible with a total nutritional approach to the prevention of diseases of overconsumption.

The Stanford Three Community Study is another such public education program (26). The Stanford Study was a bilingual mass-media health education campaign in three California communities, one of which served as a control. Participants in the two experimental towns, selected to fit coronary heart disease high-risk criteria, were subjected to a two-year multimedia health education campaign which consisted of (a) direct mailings of booklets and cookbooks, (b) newspaper columns by a doctor and a dietician, (c) public service announcements on radio and television, and (d) diverse other communications. The objectives of the campaign were to inform, persuade, and teach people the skills needed to reduce their consumption of cholesterol and saturated fats, and to increase their consumption of unsaturated fat.

A subsample in one town received three months of intensive personal instruction in groups of 20 with a health counselor, a physician, and a

dietician, in addition to the mass-media education. The intensive instruction involved information about healthful dietary practices and principles of behavior modification as applied to habit change. Dietary behavior before and after the campaigns was assessed using a dietary questionnaire which estimated the average daily consumption of cholesterol, saturated fat, and polyunsaturated fat by participants. Both intensive instruction and the mass-media campaigns led to significant reductions (20 to 40%) in cholesterol and saturated fat consumption in men and women. However, intensively instructed men tended to outperform those exposed only to mass media. Improvements in the treated communities were maintained over the two years of the study. This project is described in greater detail by Farquhar later in this book.

The effectiveness of projects such as these have implications for the feasibility of teaching nutrition and health-related eating behaviors on a wide scale.

Improve Food Labeling

Because food is often promoted on the basis of appearance and convenience and not on the basis of nutrition and calories, clear, concise, and informative labeling of all foods is desirable so American consumers will be able to identify and purchase nutritious, low-calorie foods. New food labeling regulations by the Food and Drug Administration require the following information per serving: (1) serving size; (2) servings per container; (3) calories; (4) protein; (5) carbohydrates; (6) fat; and (7) percentages of the U.S. Recommended Daily Allowance. Charles Edwards, Commissioner of the Food and Drug Administration, said: "These regulations will bring about the most significant changes in food labeling since food labeling began" (46). The new regulations are an important step toward improving nutrition and weight management; however, nutrition labeling is still voluntary for most foods. Only if a nutrient is added to the food or a nutritional claim made for it must the food include nutritional information per serving. Thus, the caloric content of cookies, candy bars, ice cream, beer, or soft drinks may not appear on the labels, and people consume them without knowing exactly how many calories are in them. It seems reasonable and simple to extend the Food and Drug Administration's labeling regulation to include *all* foods and to include the percentage of sugar in the product so consumers can make intelligent decisions about what they want to purchase.

The New York State Assembly Task Force (29) recommends that statutes dealing with unfair and deceptive practices be amended specifically to acknowledge that certain advertising claims and techniques are unfair when directed to children and that legislation should be enacted ensuring that parents know the added sugar content of the products advertised for and

purchased by their children. The Task Force recommends that such legislation require that the sugar content of a product be clearly disclosed on the label and that it be clearly stated in all advertisements for such products.

Examine the Role of Vending Machines on the Consumption of Food

An increasing part of the American food marketing picture includes the sale of food from vending machines situated in such locations as schools, parks, and sports arenas. These machines often offer a severely restricted variety of snacks—usually only those high in sugar, fat, and calories. Recently, a few educational institutions have begun to examine this situation. The Dallas School Board (15) passed the following regulation:

> The Board of Education believes that a student has the right to high quality nutrition and excellent health education. Vending machines in schools shall offer optimal choices to students and all food and drinks sold in vending machines shall be nutritious and selected for maximal appeal to students, excluding any foods or drinks with a highly concentrated sugar base. Accessibility to vending machines shall be controlled and shall not compete with the regular school lunch program.... Machines shall be stocked with such items as fruit and vegetable juices, dietary soft drinks, milk, nuts, seeds, cheese products, crackers, fresh fruits, chips, etc.

Other changes in this area are also occurring. A new bill, The Child Nutrition Act (9), signed into law in November 1977, gives authority for what can be sold in vending machines on school property to the U.S. Secretary of Agriculture. According to Secretary Bergland, the Department intends to banish candy and soda pop as well as other highly sugared dessert-type items. The law also sets up a policing agent to regulate the nutritional content of the school lunch and breakfast programs.

Jean Mayer (30), a noted nutritionist, and a number of other people have addressed the issue of vending machines on federal government property. They proposed that 50% of all foods sold on government property be nutritious, low-calorie foods.

These changes, if and when implemented, could provide children and adults as well with opportunities to purchase nutritious, low-calorie snacks and thus develop and maintain good eating habits.

Investigate the Role of Advertising in the Conditioning of our Eating Habits and Consumption

Evidence suggests that food advertising—especially low-nutrition, high-calorie food advertising—abounds and does influence the nutrition

knowledge and eating habits of the population. All the causal relations between television advertising and eating are not known (34, 42), and clearly more research is needed in this area before definitive actions should be taken. However, there is sufficient data to suggest some tentative action at this time.

We might consider regulating the type and quantity of televised food advertisements. Perhaps every time there is an advertisement for a "junk" food, an "anti-junk" commercial or one for nutritious food could be required. We might consider banning the advertisement of all such foods on television.

The federal government, through the Federal Trade Commission (FTC) and the Federal Communications Commission (FCC), has long accepted the role of regulator of advertising and broadcasting, the FCC for amount of advertising and advertising practices, and the FTC on fairness and questions of content. However, although the FCC has the authority to regulate television advertising, especially for children, it is not mandated to do so. It seems reasonable that the FCC could be *given* a mandate to assess children's advertising quantity as it relates to quality of service and other licensing requirements.

The Federal Trade Commission is, in fact, moving toward controlling ads for such items as candy, soft drinks, and cereal. FTC Chairman Michael Pertschuk stated recently that the commission is seriously considering a total ban on children-oriented advertisements of products containing large amounts of sugar (40).

The New York State Assembly Task Force recommends legislation at the state level to control advertising, especially for children. The Task Force states that such regulation would be well within the legitimate power of the state—the power to legislate on all matters relating to the health, safety, and welfare of its citizens. They state that this kind of state legislation is clearly related to existing regulation by the state in the area of dairy products, mail-order merchandise, and real property sales. In all these cases, the state requires certain information to be included in advertising for a product in order to inform the public of the quality, price, or qualifications of the advertising. They recommend that New York State take those actions which "will serve to balance the current imbalanced mix of food products advertised to children." They strongly suggest that New York State broadcasters be encouraged to show public service announcements for New York farm products and both teach about and advocate a balanced diet during the time period when the concentrated child audience is viewing the mass dosage of advertisements for sugared cereal and snack food. They recommend that the New York legislature call upon New York's commercial stations to pledge in their application for renewal that they will air such educational food and nutritional public service announcements, and they recommend that the state develop a mechanism to intervene officially in proceedings before the FCC. They conclude that action to correct broadcasting and advertising abuses at

the state level appear not only feasible but necessary in the light of current industry and federal agency inaction.

Examine Tax and Agricultural Subsidy Policies on Food Production and Consumption

The U.S. Department of Agriculture subsidizes the growing of a variety of crops, such as sugar, tobacco, and wheat. Groups such as the American Medical Association have lobbied to eliminate farm subsidies for tobacco. They argue that since we have established a causal relationship between cigarette smoking and cancer, it does not make good health or financial sense for the Department of Health, Education, and Welfare to spend millions of dollars each year trying to reduce cigarette smoking, while the Department of Agriculture subsidizes the growing of tobacco.

These recommendations might be extended so that the Department of Agriculture would not provide subsidies for any crop with associated health hazards. Health professionals have concluded that our increasing consumption of sugar, is a health hazard because it adds high calories with few nutrients, increases dental problems, and consumes money that could be spent for more nutritious foods (2, 8). Therefore, it might be in the nation's health interest not to provide farm subsidies to grow sugar.*

We also might examine the role of taxes in modifying our purchasing and eating behavior. Our society has always used taxes on specific products to generate income and to reduce the purchase of those products that society has deemed unhealthy. For example, the large tax on cigarettes is used to generate income for education and health projects, and, it is hoped, to discourage some cigarette buying. There is a tax on liquor for similar reasons. There might also be a tax on sugar or a tax on vending machines selling junk foods in order to increase their price and, therefore, to decrease somewhat the consumption of these foods, and, as a byproduct, to generate tax revenue for health programs.

Summary

These proposals are presented to increase good eating habits and decrease bad habits. As succinctly stated in *Dietary Goals for the United States* (48):

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*Farmers do not need to worry whether they might go out of business, for there are many other food crops that can be grown in place of sugar. Furthermore, with today's food shortages, more nutritious crops such as wheat or soy beans are needed to help feed the many hungry people of the world. It is true that changing eating patterns have always affected what farmers produce. However, if new dietary goals are implemented over time, then all people can benefit from improved health and lower medical bills, while the economic adjustments and hardships for particular producers and marketers can be minimized.

> What people eat is not only affected by what scientists know or what doctors tell them.... It is affected by government decisions in the area of agricultural policy, economic and tax policy, export and import policy, etc., and involves questions of food production, transportation, processing, marketing, consumer choice, income and education, as well as food available. Nutrition, then, is the end result of pushes and pulls in many directions, a response to the multiple forces creating a "national nutrition environment."

Effective education must be accompanied by government policies that make it easier, indeed likely, that an individual will change his or her lifestyle in accordance with information offered.

PROPOSALS FOR INCREASING GOOD PHYSICAL ACTIVITY HABITS

The same kind of approach used to improve our eating habits could also be attempted to increase good physical activity behaviors and to decrease poor behaviors. Following are a number of proposals designed to meet these goals.

Establish National Physical Fitness and Sports Facilities Goals

A comprehensive study could be undertaken to establish minimal national standards for the type and number of sports and recreational facilities needed per 10,000 people. These plans should obviously consider convenience and access to these facilities so people will be inclined to use them. After the comprehensive study is completed, efforts should be directed at implementing the national standards with federal, state, and local funding to build and maintain these sports and recreational facilities.

National fitness goals, serving the same functions as national dietary goals, should be established and implemented. This might involve an operational definition of "fitness" (i.e., ability to perform task X in Y amount of time with heartbeat rate of Z) as well as a plan to aid citizens in reaching these goals.

Improve Physical Education Programs

Physical education programs similar to the proposed nutrition education programs need to be increased and upgraded for health professionals, students, and the public. On the public level, we now have the President's Council on Physical Fitness and Sports, which sponsors physical fitness advertisements on television and several physical activity programs. The role given to this council could be expanded from an advisory body to a coordinator of greatly expanded federal and local programs encouraging physical activity.

Expand Employer-Sponsored Sports Facilities and Programs

Most grade schools, high schools, and colleges provide sports facilities, programs, incentives, and requirements for their students or "employees" to use while attending school or while "on the job." A few governmental, medical, and corporate institutions provide employees with similar physical activity facilities and programs. For example, the U.S. Department of Justice in Washington has a gym and an active exercise program for its employees. The Phillips Oil Company has a very active employee sports and exercise program for its employees (19). Phillips provides a wide variety of gym facilities, sports programs, and awards for participation in these programs. One often sees before work, at lunch, or after work people going to the gym and having an exercise break rather than a food break. Other large corporations are beginning to develop executive physical fitness programs. These examples of employers' efforts to maintain good health and weight control of their employees through sound physical fitness are, unfortunately, the exception rather than the rule. Hopefully, more institutions will develop similar programs.

Examine Tax Policies, Incentives, and Physical Activity

Today there is an energy crisis, particularly a shortage of oil. In examining the energy crunch, there really is a large source of energy that is untapped in our society—the adipose tissue of millions of Americans. There are approximately 70 million Americans who are overweight and, if we say that they average ten pounds' overweight (a conservative estimate), that is equal to 700 million pounds of fat. Multiplied by 3500 calories per pound, this is over 2450 billion calories of energy that is stored in the fat cells of Americans. How can we use this energy source and save our precious gasoline? The State of Oregon is already indirectly solving, in part, this problem. They allocate 1% of their gasoline taxes for building bike paths that are safe and convenient. By increasing our bicycling, both for recreation *and* for transportation, we can burn off fat, reduce our weight, release tension, decrease appetites, improve our cardiovascular conditioning, decrease air pollution, and reduce gasoline consumption.

Change the Focus in School Programs

Nelson (36) suggests that we change the focus in school athletics programs in our grade and high schools, as well as our colleges. He states that the current system emphasizes winning and competition and, therefore, favors natural athletes who are named to play on school teams. An alternative system that encourages each child to set goals and develop his physical potential and that offers effective exercise programs that can be continued

beyond school years would be more likely to maintain interest and involvement in physical activity.

SUMMARY

We have outlined the medical risks of our current American eating and physical activity habits, presented a macroenvironmental analysis of the determinants of these habits, and then recommended a number of proposals for modifying the eating and physical activity habits of individuals and society in general. These proposals are neither comprehensive nor exhaustive, and other proposals can and should be made. Our hope is to get scholars, educators, doctors, public policy-makers, and others to start thinking about the possibilities of a macroenvironmental analysis of the causes, preventions, and treatments of obesity, cardiovascular diseases, and other medical problems at the *societal* level.

These proposals are based on the assumption that there is a mandate from our political leaders and the public to improve our eating habits, physical activity habits, and weight management. That mandate does not exist at the present time. Since these proposals really involve the political processes of our country, implementing them will involve influencing the behaviors of our political leaders and the public. As concerned citizens, parents, and professionals, we have a responsibility to encourage our professional associations, political leaders, and the general public to support effective nutrition, physical activity, and weight control programs. Or in the words of Dr. Hegsted (18), Professor of Nutrition, Harvard School of Public Health:

> Ischemic heart disease, cancer, diabetes and hypertension are the diseases that kill us. They are epidemic in our population. We cannot afford to temporize. We have an obligation to inform the public of the current state of knowledge and to assist... in making the correct food choices. To do less is to avoid our responsibility.

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The Comprehensive Handbook of Behavioral Medicine, Volume 2

CHAPTER 3
Behavioral Treatment of Obesity: Progress But Not Panacea

Richard L. Hagen

One scarcely has to build a case for the seriousness of obesity as a hazard to both physical and psychological health. Obesity is associated with coronary heart disease, atherothrombotic brain infarction, congestive heart failure, high blood pressure, high serum cholesterol, high triglycerides, and high density lipoproteins. And then there is the great social and psychological price the overweight individual must pay. We are told that obesity is one of the most serious and prevalent health disorders in the United States (29), with estimates that as many as 80 million Americans are dangerously overweight.

In many ways, obesity lends itself exceptionally well to the constraints of the science game, and therein also lie some of the reasons for so much focus on the area. In his 1974 Presidential Address to the American Psychosomatic Society, Stunkard (84) pointed out that in part the rise of interest in obesity treatment has derived from the availability of a powerful independent variable, the ability to precisely specify behaviors in a therapeutic intervention, and a dependent variable of unprecedented reliability, validity, and economy in psychotherapy research. In addition, researchers in weight reduction do not run the risk of being called "clinically irrelevant" by those who, for example, have heaped scorn on the efforts of investigators of small animal phobias. Because of its "clinical relevance," weight reduction also offers an excellent problem on which to test theoretical and clinical problems (23). But perhaps more important than any other reason, the availability of huge numbers of subjects has encouraged research in obesity.

A LOOK AT THE ROOTS OF OBESITY RESEARCH

Although obesity has been the focus of both informal and formal treatment efforts for years, the results of such efforts up through the 1960's were decidedly discouraging. The classic review article by Stunkard and McLaren-Hume (85), for example, covered the obesity literature from the previous 30 years and concluded that the results of treatment for obesity were "remarkably similar and remarkably poor." Out of hundreds of reports, only eight met even modest criteria for interpretability. Furthermore, in general the results showed that only 25% of the patients were able to lose as much as 20 pounds and only 5% lost 40 pounds.

During the period reviewed by Stunkard and McLaren-Hume, behavioral treatment programs were relatively unknown and certainly not looked on with much respect. Some of the ingredients in treatment we now refer to as "behavioral" were in use, but apparently they were poorly systematized and often struggled under a heavy psychodynamic overlay.

The first theorists to clearly lay out a behavioral framework for tackling the problem of overweight were Ferster, Nurnberger, and Levitt in 1962 (20). Their article set forth a strategy for a functional analysis and systematic change of the stimulus factors surrounding the process of overeating. The goal of the program, as the authors point out, was "the development of self-control in eating which will endure and become an available part of the individual's future repertoire."

Perhaps because the article was published in an obscure and short-lived journal, or perhaps because results were not presented, the Ferster et al. article did not receive much attention. However, this work was a direct precursor of Richard Stuart's (82) impressive report of weight losses in eight of ten women over a period of a year. Impressive results, the application of behavioral methods, and all the advantages the field of obesity offered to the researcher set the stage for a "gold rush."

Stunkard (84) pointed out that the following four studies touched on key issues and set the pace for the next decade of research: Harris (38) introduced a no-treatment control group; Wollersheim (92) showed that behavioral treatment was better than a placebo control; Penick, Filion, Fox, and Stunkard (75) demonstrated that the behavioral methods were effective with the severely obese and also that young, inexperienced therapists using behavior therapy did better than experts using the "full armamentarium of traditional therapy"; and Hagen (30) showed that the principles, presented in a written form, could be effective with only minimal therapist contact.

There are now over two hundred articles related to behavioral treatment of obesity, and interest in the area does not seem to have tapered off. What has all this work produced? Have any promises been fulfilled?

AN OVERALL EVALUATION

The first point on which we find considerable agreement is: Behavioral treatments for obesity are effective at least in the short run, and these treatments consistently show themselves superior to no-treatment control groups, placebo groups, traditional diet-therapy groups, insight-oriented groups, nutritional information groups, etc. (1, 3, 22, 44, 56, 75, 83, 86, 94). Behavioral treatment for obesity appears to be the best treatment yet developed. However, it is important to point out that there is a second characterization that finds agreement among the reviewers: The clinical utility of behavioral treatment is discouraging because of the large number of individuals who make minimal or no progress in these programs. It is also discouraging that few new ingredients added to the basic program during the past decade can claim strong support for additional effectiveness.

The movement toward research that isolates component parts of treatment packages and evaluates these for differential effectiveness is promising. Attempts are being made to identify treatment parameters that produce the best results. Researchers are struggling to match subjects to treatments, to conduct process obsevations on successful and unsuccessful subjects, and to maximize cost effectiveness of treatment. All of these efforts hold promise for helping us sharpen the admittedly dull tools we now possess. This review is largely a critique of these efforts. For those unfamiliar with behavioral treatments of obesity, I will start with a description of what goes into the normal "treatment package."

INGREDIENTS OF A BEHAVIORALLY ORIENTED TREATMENT FOR OBESITY

Behavioral programs almost always involve stimulus control efforts, reinforcement procedures, and habit development. In addition, aversion procedures, relaxation training, cognitive restructuring, nutritional education, and exercise programs are often included. The typical program progresses in the following manner.

Clients are generally asked to keep extensive records of their eating behaviors. They record what it was they ate, how much, at what time of day, where they were, whom they were with, and how they felt (84).

These records are used in a number of ways. Stimuli that are associated with inappropriate eating are targeted for elimination (e.g., certain places or people who can be avoided); or when the stimuli cannot be eliminated, alternative noneating activities are planned. Many of the stimuli that turn on our gustatory juices are removed. Foods are put in opaque containers.

Tantalizing packages are covered up or replaced. Light bulbs are taken out of refrigerators. Serving dishes are kept on the stove rather than the dining table. Efforts are also made to bring eating under the control of new, distinctive stimuli that will only be present when eating is appropriate. Patients are told to eat only at specified places, specified times, and on colorful place mats with distinctive table settings. Moods or emotions associated with eating are identified and noneating strategies are developed to cope with them. The act of eating is modified, with emphasis on slowing down, chewing food thoroughly, and introducing delays in the meal. Finally, there is usually an emphasis on reward for appropriate behavior change. Rewards are to be given frequently, promptly, and for small steps of progress.

Aversive treatments, which may or may not be included, emphasize reducing the attractiveness of certain foods. These procedures, often based on a classical conditioning model, also fall in the general behavioral category.

Additional procedures, which emphasize exercise or nutrition counseling, cannot be couched as easily in behavioral jargon, but they are generally included in today's broad-based treatment programs.

The reader is referred to Ferguson (17) for a manual outlining in detail most of the above procedures.

ARE SOME INGREDIENTS MORE HELPFUL THAN OTHERS?

With such a hodge-podge of procedures, researchers have understandably asked whether or not some are more helpful than others. The literature does not yet allow us to tease out the effectiveness, or ineffectiveness, of all of the treatment ingredients commonly used, but an encouraging beginning has been made in the sorting process.

Self-Control

It has become customary in review articles to categorize obesity studies under "self-control" and to attempt to evaluate the contribution of self-control procedures relative to other procedures (e.g., 1, 22, 94). For several reasons, I'm departing from this tradition.

First, a certain amount of self-control, as it is commonly construed, is an element in most of the procedures used in weight reduction, whether these procedures be stimulus manipulation, self-reward, behavioral or cognitive restructuring, or procedures involving some kind of covert practice. Secondly, many treatments characterized as self-control programs involve much more than self-control and may have little to do with self-control per se. For example, although Harris and Hallbauer (40) entitled their study "Self-directed weight control through eating and exercise," one of the program's ingredients was a monetary deposit with the therapist which could be earned

back by losing weight. It is true that the subjects decided what to deposit; however, once the contract was made, the contingent monetary reinforcement was controlled by the therapist. In this case, it is not possible to separate the effects of self-control from therapist control. Other self-control studies have been contaminated by heavy doses of therapist and peer praise, approval, disapproval, and other types of attention.

Despite methodological problems, most of the studies of "self-control strategies" have made important contributions. Unfortunately, we cannot yet isolate self-control factors from other active therapeutic ingredients.

Stimulus Control

Although stimulus control is one of the central ingredients in most behavioral treatment programs for obesity, only one study attempts to isolate the effects of stimulus control procedures from the large-package traditional behavioral treatment. Paulsen, Lutz, McReynolds, and Kohrs (74) compared a multidimensional program modeled after Wollersheim (92) with one emphasizing stimulus control (e.g., the use of a "personal plate," using a shopping list to buy groceries, storing foods in non-see-through containers). Both groups lost significant amounts of weight, 16.1 and 18.5 pounds for the multiple technique and stimulus control conditions respectively. At three and six months' posttreatment, however there was a significant difference in favor of the stimulus control treatment. At 18-month follow-up, the multiple technique group maintained 50% of their original loss and the stimulus control subjects maintained 80% of their loss. The investigators suggested that the superiority of the stimulus control condition may have been related to the simplicity and action orientation of the treatment. This study supports the notion that stimulus control is one of the most important ingredients in the standard behavioral program.

Contingent Reinforcement

Like stimulus control, operant procedures have played a major role in most large-package behavioral treatment programs. The dimensions that have been investigated have been who controls the reinforcers, the nature of the reinforcers, and the type of reinforcement used. Statements about the effectiveness of contingent reinforcement must be made with considerable specification.

Contingent Reinforcement in Restricted Environments

When the therapist controls reinforcers that are important to the patient, he can be induced to lose weight. In restricted environments such as mental institutions, tokens and privileges have been used successfully to bring about

weight reduction in the emotionally disturbed and/or schizophrenic patients (e.g., 7, 15, 88).

Therapist Control vs. Client Control of the Reinforcers

In working with clients who are not institutionally confined, the therapist generally has little or no control of the tangible reinforcers that are important to his client. However, during periods of high motivation and optimism, clients will often sign over to the therapist possessions or money with the understanding that these can be earned back by weight loss or appropriate "weight loss behaviors." It is also possible for the patient to self-administer tangible rewards.

Several studies have attempted to determine which reinforcement procedure is best. A typical contract giving control of reinforcement to the therapist is described by Harris and Bruner (39):

> The contract specified that S agreed to make a cash deposit of XN dollars and would receive it back at the rate of X dollars per pound, ($1.00 or 50¢ in all cases) to be paid the week after each pound's loss was recorded, until N pounds had been lost and all XN dollars had been refunded. The contract also provided for forfeiture of the remaining dollars if an S did not appear at his weekly weight check or notify E that he would not be present.

In a study testing the standard self-control procedures against the above contract, Harris and Bruner (39) found that at the end of a 12-week treatment the contract group had lost significantly more weight than the self-control group; however, at follow-up this difference was not maintained. A significantly greater number of subjects declined to participate in the contract group, and the self-control group had more favorable comments from participants. Because of the higher rejection rate of the subjects, the less favorable comments, and the lack of additional long-term value of the contract, the investigators suggest that "contract treatment" has limited applicability.

Using a different design, Hall (32) compared traditional self-control procedures with an experimenter-controlled reinforcement procedure during which subjects could earn $15.00 for reaching a weight-loss goal. In a counterbalanced design, subjects were given one procedure for five weeks and the other for the following five weeks. Hall concluded that only the therapist-control reinforcement procedure resulted in weight lossess large enough to be of practical value.

In a similar study, Hall, Hall, DeBoer, and O'Kulitch (34) compared a self-management group, which received the traditional package of behavior modification self-control techniques, with an external reinforcement group which was treated with short nondirective discussions and a chance to earn money for losing weight. Both groups lost significantly more weight than two

control groups (delayed treatment and insight psychotherapy), but they did not differ from each other. Surprisingly, the external reinforcement group did not show posttreatment weight gain (at three or six months), but the self-management group did.

The above results contrast with those obtained by Jeffrey (45), who manipulated the locus of monetary reinforcement (self vs. therapist). Subjects who self-administered reinforcers did as well as those whose reinforcers were controlled by the therapist during treatment, but they maintained their losses better during follow-up.

Procedural differences make the above studies largely incomparable. For example, Hall's studies involved primarily stimulus control in the self-control condition while Jeffrey's utilized contingent monetary reinforcement. The inconsistency in results suggests it is too early to rule out one or the other type of procedure. Both are apparently effective.

There are several precautions to be observed in the use of therapist-controlled reinforcement procedures. For example, subjects may take unwise chances with their health in order to meet a weight-loss goal. Mann (63) reported: "Unsolicited anecdotal reports from some of the subjects indicated that they had used extreme measures at various times to lose weight rapidly and temporarily in order to avoid aversive consequences. These measures, reportedly, included taking laxatives, diuretics, and doing vigorous exercises just before being weighed." Rozensky and Bellack (78) found that high self-reinforcers do more poorly than a control group under conditions in which they are paid for losing weight.

Rewards Contingent on What?

One possible solution to the problems of therapist-controlled rewards and weight loss. Mahoney (59) compared subjects who self-rewarded for weight loss with those who self-rewarded for habit improvements. Both of these procedures were more effective than a treatment involving a combination of goal-setting and self-monitoring, and success was "substantially greater when subjects rewarded themselves for altering their daily eating habits rather than simply reducing their weight."

Self-Control: Reward or Punishment?

If one opts to place total control of rewards in the hands of the patients, how might the patient be encouraged to use the rewards most effectively? To help answer this question, Mahoney, Moura, and Wade (61) emphasized punishment and reward in the following manner: Subjects in a weight reduction program each deposited $21.00 with the experimenter. The self-reward group could reward themselves for changes in weight or eating habits

by asking that various amounts of their initial deposit be placed in personal accounts which they would ultimately claim at the end of treatment. Subjects in the self-punishment group were instructed to fine themselves for lack of weight loss and/or lack of behavior improvement by designating amounts of their initial deposit to a community pool. In addition to these two groups, a group using both self-reward and self-punishment and several control groups were used. The results support the position that self-reward strategies are superior to self-punitive strategies.

Social Reinforcement

The behavior modification literature has demonstrated that social rewards, in the form of praise, approval, or attention, are among the most powerful that can be ethically and legitimately used. The social reinforcement aspects of group meetings have long been used by behaviorists and groups such as TOPS and Weight Watchers. Several early studies showed the power of social reinforcement in successful weight reduction with institutionalized patients (e.g., 27, 70). More recently, however, there has emerged an emphasis on the utilization of the patient's family and/or the development of a buddy system with specific programming of the use of social reinforcement. Mahoney and Mahoney (60) made what they term "social support engineering" a focal point in obesity treatment. Families of participants in the program were invited to all sessions, and one session was devoted to their role in the program. These family members were asked to "restrict their feedback to praise... avoid offering the subject food... and... cooperate by compromising their own meal and snack patterns in a way which was beneficial to the subject." Subjects' reports of family cooperation and encouragement (summarized and rated) correlated at .92 with weight loss at the end of treatment and .39 at the end of one year.

A similar approach using verbal punishment as well as positive social reinforcement is seen in a case study reported by Matson (66). After unsuccessfully treating a client for ten weeks by self-monitoring and environmental restructuring, Matson began structuring the social reinforcement offered by his client's husband. Mr. L. was instructed to eliminate verbal abuse and to compliment his wife when she met the criterion of a two-pound-per-week weight loss. If she did not meet her goal, Mr. L. was to use verbal abuse as frequently as he desired. During this phase of treatment, the client lost 39 pounds in 19 weeks. She attributed her success to self-confidence created primarily by praise she received from her husband.

It has been argued that one of the most effective ingredients in the Alcoholics Anonymous approach is the mutual help of social reinforcement members give and receive during regular meetings. Kessler (49) attempted to evaluate the effectiveness of this ingredient in a weight reduction treatment

program by comparing a control group to two behavior therapy groups, one of which had a "mutual help" component. Members of the "mutual help" group were divided into pairs and were told to call their partners when they were in an emotional state that might lead to inappropriate eating. Although at the end of a six-week program the two treatment groups did not differ in pounds lost (11 and 11.8 pounds), this rapid weight loss may have been maximal and concealed the effects of the buddy system. No follow-up data are reported. The idea is a reasonable one, which should be pursued in a longer treatment program with adequate follow-up evaluation. Social support engineering with specifically targeted social reinforcement seems useful for obesity treatment programs, and a fruitful area for future research.

Aversive Procedures

What we commonly call "aversive procedures" in the treatment of obesity usually refers to classical conditioning efforts. In layman's terms, however, punishment (based on an instrumental paradigm) is also "aversive." To further muddy the waters, when a noxious stimulus is presented in the presence of food stimuli and in the presence of behaviors that involve approaching, looking at, smelling, or touching food, the procedure may qualify as either classical or instrumental conditioning, or both. In general, procedures that claim a classical framework have been devised in an effort "to reduce craving for problematic foods" (22). It has been assumed that by pairing a stimulus that causes an unpleasant experience (for example, electric shock or a noxious odor) with food, that the food will eventually elicit a similar unpleasant feeling and will accordingly be unattractive, or at least, less attractive than prior to the conditioning. Instrumental procedures, on the other hand, are designed to decrease the frequency of behaviors involved in the food-consuming process.

Use of Electric Shock

The first published account of aversion therapy for obesity is a case study by Wolpe (93). Electric shock was presented while the patient imagined a target food. Wolpe reported that the patient's obsession for the food diminished markedly. Follow-up of her eating behaviors was prevented by her death from unrelated causes soon after treatment.

Ten years after Wolpe's report, two other case studies appeared. Thorpe, Schmidt, Brown, and Castell (87) reported a treatment similar to Wolpe's with a patient who had compulsive overeating episodes. In this case, the word "overeating" was paired with shock, and, in addition, the words "normal eating" signaled the end of each treatment session, characterized by the investigators as a "relief stimulus." The patient's verbal reports were

encouraging. However, after the eighth treatment session, she discontinued treatment. Neither weight data nor follow-up verbal report data are available. Meyer and Crisp (69), using a punishment paradigm, shocked patients for approaching a "temptation food." One patient was treated for six weeks (the number of treatment sessions is not stated) during which time her weight went from 205 to 185 pounds. During the six months following treatment, she continued to lose weight and at a 20-month follow-up was maintaining at 133 pounds. The second patient refused to cooperate with the aversive procedure after receiving one shock.

Compulsive eating was also treated by Wijesinghe (90), who punished the touching, handling, and nibbling of food with a buzzer and shock or a buzzer alone. The entire treatment, consisting of six 30-minute sessions, was conducted on a single day. In one case, the authors report a complete cessation of the compulsive eating throughout a one-year follow-up with no further treatment. In the second case, "compulsive eating stopped immediately after treatment" and, in addition the patient's weight went from 190 pounds to a maintenance weight of 162 pounds one year later with no dietary restrictions.

The only group study on the effects of aversive conditioning with electric shock is by Stollak (80). This carefully designed study has such a large number of subjects that it is unlikely that it will ever be replicated. The results of this study showed that the aversion therapy group lost no more weight than did a number of different control groups including a "non-specific shock group." The study failed to show that shock aversion therapy had any effect on the gross measure of weight loss, but as the authors point out, no conclusion can be drawn about the usefulness of the procedure in treating a food obsession.

Use of Noxious Odors

One of the most innovative ideas in aversive treatment for obesity was presented in studies by Foreyt and Kennedy (48, 25). Reasoning that the noxious stimulus is likely to be maximally effective if it affects the same sensory modality as the target (the food), these investigators devised an apparatus that would deliver one of six noxious odors (e.g., butyric acid, pure skunk oil, etc.) while the subject was smelling, handling, and chewing the target food. In the 1968 study, the authors reported a single case with a 30-pound weight loss. In 1971, the same investigators reported an experimental study showing a significant weight loss in a group of women receiving olfactory aversion therapy. As pointed out by the authors, the study did not provide an adequate test of aversion therapy per se because of the inadequacy of the control group and because of additional procedures used along with the aversion treatment.

Following the report by Foreyt and Kennedy, Maletzky (62) combined the use of valeric acid (a nauseatory odor) with covert sensitization to reduce a patient's compulsion to eat chocolate. He reported that after ten conditioning sessions, the patient usually refrained from eating chocolate. Furthermore, she continued to lose weight throughout a seven-month follow-up. The second case, reported by Morganstern (71) used cigarette smoke as a noxious stimulus. The patient was treated once a week for 18 weeks. Ten times each session, she was given the target food to chew on for a few seconds. Then she took one long "drag" on a cigarette (reportedly an extremely unpleasant experience for her), and immediately spit out the food. Apparently, target foods were completely eliminated along with 53 pounds of fat. Unfortunately, after the 24th week, the patient left the community and could not be reached for follow-up.

The above reports all suggest that aversion therapy using noxious odors may be helpful in weight reduction; however, in all of them it is difficult to separate out the effects of encouragement, attention, tactical feedback, pressure from the therapist, and from the effects of the odors. Frohwirth (28) conducted a conservative test of these procedures by making them the central focus of treatment and by reducing other factors, such as therapist pressure, to a minimum. In addition, he utilized a well-designed placebo control treatment. Results in terms of weight loss were, in the words of the investigator, "clinically trivial" for all groups, and there were no significant differences among them at posttreatment or at a ten-week follow-up. Frohwirth concluded that suggestion and expectancy probably play the major role in this particular type of aversion conditioning.

Use of Imaginal Stimuli: Covert Sensitization

Joseph Cautela (13) reasoned that if a food can become aversive, or less attractive, through pairing with some noxious stimulus like shock or a foul odor, then by analogy one might make *thoughts* of food aversive by pairing such thoughts with *thoughts* of a noxious stimulus. He characterized the procedure as "covert" because all the stimuli are imagined by the patient, and he used the word "sensitization" because the goal of this treatment is to build up avoidance responses to a formerly approached stimulus.

Early case study reports by Cautela (13), Murray and Harrington (73), and Maletzky (62), seemed very promising. Furthermore, group designs by Janda and Rimm (43) and by Manno and Marston (64) showed that the procedure was more effective than attention-placebo treatment or "minimal therapist contact." Elliott and Denney (16) compared the effectiveness of covert sensitization treatment, covert sensitization augmented by false physiological

feedback and an attention placebo. All groups lost weight, and they did not differ significantly in amount lost. There were, however, significant differences in subjects' ratings of the target food. In absolute terms, subjects in the group receiving covert sensitization plus physiological feedback decreased their food ratings the most. Ratings by the attention placebo group decreased the least, and covert sensitization ratings fell between these other two. The investigators concluded that the components common to all three procedures (periodic weigh-ins, diet planning and counseling, self-monitoring of food intake, and nonspecific encouragement and attention) apparently accounted for the significant weight loss by all three groups. Although they do not suggest covert sensitization for general treatment, they do suggest that for patients who are troubled by specific food obsessions, the procedure may be valuable, especially when it is accompanied by false physiological feedback.

In summary, studies on covert sensitization show mixed results on weight reduction but consistently positive results in reducing subject ratings of traget foods. The most serious challenge comes from studies that have evaluated the theoretical underpinnings of covert sensitization. Three studies have found no evidence of conditioning. Sachs and Ingram (79) reported data suggesting that backward conditioning, which violates the principles of learning used to explain the effects of covert sensitization, works as well as forward conditioning. Foreyt and Hagen (24) compared "conditioning" and suggestion by telling overweight subjects, using an elaborate, fabricated rationale, that they would form aversions to foods if images of these foods were paired systematically with plesant, relaxing thoughts. Subjects in the suggestion-placebo group developed food aversions of the same magnitude as did subjects in the true covert conditioning group. Furthermore, weight loss did not differ between the groups. They concluded that no conditioning is occurring with covert sensitization. It appears that expectancy, and perhaps demand, account for the behavior change subsequent to covert sensitization. Diament and Wilson (14) replicated the Foreyt-Hagen study with additional dependent measures and found the same results.

It appears that cognitive conditioning procedures involve little, if any, "conditioning" as behaviorists commonly think of it. There appears to be a strong placebo effect to covert sensitization.

Covert sensitization is not a widely used technique, in part because of its questionable theoretical base. I would not want to see us throw out, however, a technique that may help people "think" they don't want certain high-calorie foods no matter what the theoretical basis of that technique may or may not be. It is impressive to the layman, it is fairly easy to administer, and it makes the patient an active participant in the treatment program.

Summary of Aversive Procedures

Although single case studies suggested great promise for the use of aversive treatment procedures for weight loss, this promise—for broad-scale use, anyway—has faded as studies have matured in design. Changes from covert sensitization are mostly placebo effects. Electrical shock is dangerous, and many subjects will not consent to its use. Noxious odors are very difficult to administer in a controlled fashion, and in addition, such a treatment causes the *therapist* to smell like a garbage dump most of the time (Foreyt, personal communication). However, for some people (e.g., highly suggestible or highly conditionable) with certain kinds of problems like specific food compulsions, aversion procedures may be optimal. It would be foolish for us to abandon these treatments altogether without further, more focused, studies.

Anxiety Reduction

There is a widespread belief that overeating is often a response to anxiety, and on that basis obesity treatment programs sometimes include procedures designed to reduce anxiety. Although progressive relaxation training has been used on occasion (e.g., 92), seldom has there been much attention given to the specific effects of this procedure, and few obesity researchers place much faith in its effectiveness. So convinced, for example, were Hanson, Borden, Hall, and Hall (36) that relaxation training would be unrelated to success in weight reduction that they used a relaxation group as a "placebo control" against which to test what they considered more promising treatments. Their relaxation group did not differ significantly from a no-treatment control. Similarly, Bornstein and Sipprelle (9) found that a relaxation training group had no greater weight loss than a group receiving nonspecific insight therapy or a no-treatment control group. From this lack of success with relaxation training, we might be tempted to conclude that anxiety does not play a role in overeating. This conclusion may be premature; traditional relaxation procedures may not be adequate to deal with the kind of anxiety that leads to overeating.

Bornstein and Sipprelle (8, 9) developed a procedure called "Induced Anxiety," which involves systematically increasing and decreasing anxiety levels. They reported an encouraging case study in weight reduction using this procedure (8) which was followed by a well-designed group study (9). Induced Anxiety Treatment was tested against three other groups: A no-treatment control; a group receiving nonspecific therapy; and a traditional progressive relaxation training group. After eight weeks of treatment, the Induced Anxiety group lost an average of 12 pounds compared to 6 pounds or less

weight loss for the other groups. At three- and six-month follow-up, the Induced Anxiety group maintained a significantly greater weight loss than any other group with a continued slight mean loss while all of the other groups showed a significant weight gain.

Kelly and Curran (47) compared Induced Anxiety Treatment with traditional self-control treatment modeled after Hagen (30), a waiting-list control, and a placebo control. The self-control group reduced their "proportion of overweight" more than any other groups at posttreatment. Unfortunately, this group did not demonstrate continued treatment superiority during the follow-up period. The Induced Anxiety group, although not differing significantly from the control groups at posttreatment, did have the second largest weight loss in absolute terms. Like Bornstein and Sipprelle (9), they found the Induced Anxiety group was the only one that continued to lose weight during the follow-up period. Although the role of anxiety in causing obesity remains unresolved, it appears that Induced Anxiety Treatment may provide a promising procedure for enhancing long-term progress.

Behavioral Restructuring

The development of habits or the practice of behaviors presumed to lead to a negative energy balance have long been advocated by all weight reduction programs. Several of these have been the focus of enough research to merit attention.

Self-Monitoring

Stunkard (84) states that many patients in his programs "come to the view that record-keeping may be the single most important part of the behavioral program." The experimental literature does not provide consistent agreement with this point.

The positive effects of self-monitoring were demonstrated by research conducted by Romanczyk and his colleagues. In two studies (76, 77), a group that self-recorded both daily weight and daily caloric intake lost significantly more weight than either a no-treatment control group or a group that recorded only daily weight. In both studies, the self-monitoring group did not differ significantly in weight loss from other more comprehensive treatment packages. In a third study (also reported in reference 77), with a considerably larger *n*, the self-monitoring procedure was significantly less effective than a comprehensive treatment program involving information, self-monitoring, relaxation, behavioral management, stimulus control instruction, and symbolic aversion. In all three of these studies, the caloric self-monitoring

group lost more weight than the control subjects but less weight than groups receiving the larger packages.

Negative results from self-monitoring programs come from Stollak (80), who found that a group that kept a food diary for eight weeks *gained* 5.0 pounds while his control groups gained 1.4 and .6 pounds. Mahoney, Moura, and Wade (6) found that a self-monitoring group lost no more than an "information" control and significantly less than other groups that used self-reward and self-punishment. In addition, Mahoney (59) compared a self-monitoring group with a delayed-treatment control and found no significant differences.

How do we reconcile these discrepant findings? From what is reported in the articles, we cannot. Stollak's (80) study gives us a clue as to what may be going on. His self-recording group gained weight when they had no contact with a therapist; when subjects kept the diary *and* met with a therapist who praised appropriate behavior, they had a significant weight loss. Unfortunately, studies do not give a clear picture of how much contact the subject had with the therapist, and it seems likely that therapist contact may have varied critically between studies. Based on Stunkard's comments mentioned at the beginning of this section, my own experience, and a broad overview of self-monitoring studies, I suspect that within the context of therapist evaluation and reinforcement, self-monitoring of caloric intake is effective. Without this contact, it is likely to produce, as Mahoney (59) says, only "transient and variable results." One footnote may be of interest to the therapist who has his patients keep records: Bellack, Rozensky, and Schwartz (5) found that a group that recorded food intake before eating lost more weight than a group that recorded after eating. This difference was maintained at follow-up.

Charting Weight Loss

Many therapists ask patients to graph their weight change as a therapeutic technique. Fisher et al. (21) reported a mean weight loss of 9.6 pounds over an average of 39 days of treatment in 11 subjects with the sole treatment intervention of self-weighing once each day, plotting the weight on a graph, and trying to keep the daily weight measure below a predrawn diagonal regression line on the graph.

Temptation Training

Murray, Davidoff, and Harrington (72) had subjects practice substituting alternative low-calorie foods after seeing, smelling, and tasting highly attractive, high calorie foods. When compared to a no-treatment control

group, the treatment group showed a significant but small, temporary weight loss.

Exercise

In 1971, Stuart argued strongly for the inclusion of exercise in a treatment package. Increasingly, therapists are attending to the importance of exercise (60). The one study designed to test the effects of exercise provides support for its inclusion in a weight control program. Harris and Hallbauer (40) compared three groups: Self-control, self-control plus exercise, and attention placebo. Following a 12-week program, there were no significant differences among the three groups; at a seven-month follow-up the self-control-plus-exercise group had lost more weight than either of the other two groups.

Nutritional Information

Training in nutrition is also becoming a standard ingredient in obesity treatment programs (60). Paulsen et al. (74) compared treatment techniques "commonly used in nutrition clinics with the nutritionist in the role of teacher" with a multiple-technique behavioral program. The behavioral program resulted in greater weight loss at posttreatment and at a one-year follow-up, but the difference between groups was not statistically significant. The nutritional training group was more effective than a no-treatment control group. One additional study (75) demonstrated that behavior modification was more effective than training in nutrition and exercise. Both nutrition training and exercise appear to be important elements of treatment; however, alone or in combination they are not as effective as large-package behavior modification programs.

Cognitive Restructuring

The past half-decade has seen a dramatic increase in interest in "cognitive behavior therapy." (See Chapter 5, Volume 3, for a discussion of this area). The goal of cognitive behavior strategies is to change our internal thoughts or statements so that more adaptive overt behavior, and even more pleasant emotional responses will occur. Mahoney and Mahoney (60) have included this element in their treatment packages and have appropriately called it "cognitive ecology—clearing up what you say to yourself." They attempt to help the subject identify and alter maladaptive thought patterns such as: "This will never work—I always regain whatever I lose." Morganstern (71) used a similar procedure when he had a patient chew on a favorite food and then spit it out saying, "Eating this junk makes me sick." Although controlled studies

attempting to isolate the effects of this strategy are yet to be reported, clinical observations have led the Mahoneys to state that "the cognitive components of our program may well have been the most important" (60).

If cognitive restructuring does play a role in treatment, it seems likely that whatever elements make it effective have also been responsible for the meager, but significant, effects reported for covert positive reinforcement (12) and coverant conditioning (41, 42). These treatments never became very popular, and an examination of their application suggests that at best they are a variety of unsystematic cognitive restructuring.

Summary of Treatment Ingredients

What then shall we include in treatment? Stimulus control procedures, social support engineering, exercise prescriptions, and nutrition training all get good marks. Self-reinforcement procedures also apparently work well. Self-monitoring and cognitive restructuring are also advised.

Serious questions can be raised in only two areas: There are dangers attached to the use of client-therapist contracting if rewards are made contingent on weight loss rather than behavior change, and aversion therapy is not advised for general application, although it may be very helpful for a client who is bothered by specific food cravings.

PARAMETERS OF TREATMENT

The type of treatment undoubtedly interacts with other treatment parameters. At present, about all that can be described are the conditions relating to the effectiveness of a broad-based behavioral package. Despite its obvious deficiencies, the data we do have are of help in providing effective and economical weight reduction programs.

Therapist Characteristics

As professional therapists, we hold tightly to the notion that therapeutic effectiveness is related to years of "apprenticeship-type" training and experience. The evidence, at least for the treatment of obesity, argues against this notion. Levitz and Stunkard (56) found that behavior modification groups led by layman (TOPS) leaders who attended 12 training sessions were as effective as those conducted by professional therapists. Similar results have been obtained when professionals have been compared to trained paraprofessionals and untrained paraprofessionals (58) and "bright, highly-motivated undergraduate students" (57). Nutritionists with minimal training

(but continued supervision) fared well when compared with professionals (67, 68), as have dieticians (18).

There are, however, some data supporting the importance of training and experience in obesity therapy. Jeffery, Wing, and Stunkard (44) found that groups led by therapists who had previously conducted two or more groups lost more weight than did those groups whose therapists had conducted less than two groups previously. Levitz and Stunkard (56) found the same results. The question of experience and training of therapists has frequently been raised in behavioral obesity studies. The data we now have suggest that beyond some point of minimal training—perhaps a ten-hour course and/or experience running several groups—experience does not add measurably to therapist effectiveness.

Amount of Therapist Contact

The importance of the amount of contact between client and therapist has usually been assessed by presenting a weight reduction program in written form and varying the amount of direct involvement by therapists. In general, studies have shown that behavioral principles presented via "bibliotherapy" with minimal therapist contact have produced results not significantly different from treatments involving a large amount of contact. Furthermore, these minimal-contact bibliotherapy studies have invariably produced better results than no-treatment or placebo control groups (11, 30, 36, 58). In these studies, the therapist contact sometimes involved a weekly five-minute phone call, a few notes scribbled on homework lessons, or less.

One study, which did not use control groups, is of particular significance because of its "field" value. Marston, Marston, and Ross (65) developed a correspondence course consisting of lesson packets mailed weekly for 13 weeks. As in some of the studies cited earlier, staff members personally answered written questions and commented on the forms sent back by participants. Data were analyzed for the first 210 participants. Of those completing and returning all 13 lessons, the mean weight loss was 13.7 pounds during the course with a continued mean loss of 2.1 pounds at six-month follow-up. For the 75% of the participants who completed nine or more lessons, the mean weight loss after the course was 13 pounds with a further loss of 1.9 pounds at six-month follow-up. These results are comparable to those reported for most behavioral weight control programs. The investigators conclude: "The results of this study based on a larger and more varied group of subjects than any yet reported, support Stunkard's enthusiasm about the public health prospects for a minimal contact behavioral treatment for obesity." Only one study has shown written materials with minimal therapeutic contact to be less effective than a treatment with regular weekly meetings (11), but here, too, the minimal contact group was more effective than a waiting-list control.

All of the data at hand support the finding that written materials with some contact from a therapist do produce weight loss, for at least a short period of time, and these treatments are more effective than no-treatment or placebo control conditions. What happens when materials are handed to patients and the therapist has no further contact with them? For this question, we also have consistent data: No-contact bibliotherapy groups are less effective than minimal contact and are no more effective than no-treatment controls (19, 46). Bibliotherapy is effective, but some therapeutic contact is necessary. Despite this conclusion, one's enthusiasm for developing a bibliotherapy to provide cost-effective treatment should not be dampened. Its potential effectiveness has not been ruled out.

Length and Pacing of Program

Jeffery, Wing, and Stunkard (44) conducted a study in which comparisons were made for the effects of 10- and 20-week programs. In addition, pacing was varied: Some groups received five treatment and five maintenance sessions alternately while others had new sessions alternated with review sessions every other week. As expected, longer treatments produced greater in-treatment weight losses, but the longer treatment did not promote any greater long-term success that did the shorter treatment. In like manner, different pacing produced only transitory differences. Weight losses over the entire program did not differ as a function of the schedule on which information was introduced.

Follow-up Strategies

The most commonly voiced criticism of behavioral obesity treatments is that "there is no reliable evidence . . . that group behavior therapy will result in permanent weight loss" (72). No matter what the data show, such a challenge is not easily answered. Research problems continue to render data collection very difficult; for example, small-sample studies are unconvincing, and large-sample studies face great difficulty in obtaining acceptable follow-up data. The longer and more convincing the length of the follow-up period, the fewer, and consequently less convincing, are the data points that can be gathered. In our highly mobile culture, people move around too rapidly for "good" follow-up research to be conducted more than a year after treatment.

I am as convinced as any of the need for five-year, ten-year, or longer follow-up studies, but, contrary to some critics, I am also quite encouraged by the evidence we presently have. Leon (53), for example, presents a summary table of follow-up results for 11 studies (it is not clear how she selected these 11, but apparently the selection was random), which shows that in 8 of the 11 the treatment-period weight loss was either maintained, or continued weight loss occurred. Follow-up periods ranged from 4 to 52 weeks in the 8 successful

follow-up studies. Successful two-year follow-up studies have been reported by Brightwell (10) and Mahoney and Mahoney (60).

Even where there is not continued loss or stability of maintenance, we cannot write off the treatment as worthless. In the McReynolds and Paulsen (68) study, for example, group mean weights increased at three-month follow-up; but one year after treatment they still maintained 75% and 80% of their original weight loss. This certainly does not represent treatment failure.

A number of researchers have attempted to enhance follow-up through the use of booster sessions. At the present time, evidence concerning the value of these sessions is mixed. Wilson and Brownell (91) did not find booster sessions to be of value during follow-up, but Kingsley and Wilson (51) found that they were, and Hall et al. (33) showed that booster sessions with the same therapist can be effective while sessions with a different therapist did not help maintain weight losses. In one of the most elaborate follow-up studies to date, Ashby and Wilson (3) varied the content of booster sessions (structured behavioral booster sessions vs. unstructured nonspecific booster sessions) and they varied the frequency of the booster sessions (every two weeks vs. every month) for a period of one year. Not only was there no differential effect for the type or frequency of booster sessions, but there also was no difference between those groups who received booster sessions and the control group which did not.

It is difficult to arrive at a summary statement concerning the value of booster sessions. Although most of the research has failed to show that booster sessions significantly enhance maintenance, there is much room for additional research and creative thinking to improve booster session content.

TARGETS OF TREATMENT

As pointed out by Hall et al. (35), most behavioral obesity studies have been carried out with "young, mildly overweight college students," which prompted reviewers to question the generalizability of these results to other populations. There are enough studies now, however, to demonstrate that the behavioral principles are applicable to diverse populations.

Stuart's (82) classic study was conducted on chronically obese women whose ages ranged from 21 to 43, most of whom were married. The very successful study by Levitz and Stunkard (56) was conducted on women who typically seek community-based treatment programs, in this case TOPS members. Similarly, Penick et al. (75) achieved excellent results with a mixed group of males and females whose median percent overweight was 78% and whose median age was 39 (range 22 to 61). Paulsen et al. (74), using a similar population, achieved "weight losses equal to or better than others in the literature...." With community-based, clinically obese populations,

Romanczyk (76), Jeffery, Wing, and Stunkard (44), and Mahoney, Moura, and Wade (60) found the same results. Only one study, that of Hall et al. (35) found that university students were more successful—not at post-treatment but at three-month follow-up.

Case studies, and a few group studies, also show success with psychiatric patients (7, 37, 52, 70, 88), an emotionally disturbed child (14), and retarded individuals (26, 27). More recently, behavioral methods have been successfully used to treat obese children (2, 50, 89). My conclusion is that effectiveness of the broad application of behavioral treatment procedures for obesity has been amply demonstrated, at least for socioeconomic status groups.

FUTURE DIRECTIONS

The above results should convince all but the most skeptical that the behavioral packages developed for the treatment of obesity during the past 15 years do have something to offer. The methods are applicable to a broad spectrum of populations and seem to work when applied by a variety of "therapist-types," with minimal therapist contact, and under a variety of therapy conditons. Follow-up data are encouraging. Although the results have been described by some as "meager"—certainly not all we could hope for—the methods appear to be as good as, and probably better than, any others available. Many questions still remain concerning the best treatment ingredients and the best conditions of treatment, and there are also several trends of research and areas of research emerging that seem to hold particular promise and deserve special attention.

Matching Subjects to Treatment

The etiology of obesity apparently involves many factors (31); hence, it does not seem likely that one treatment package will be the best for everyone. Indeed, the great variability seen in weight loss as a result of behavioral treatments (44) points to the need to match subject and treatment characteristics. Work on this topic in the past has been imparied by the dismal results of exploratory studies attempting to relate treatment outcome to demographic, personality, or behavioral subject variables (see 60, 68). In addition, an inordinate sample size is required to adequately explore the many combinations of treatments and types of patients.

At the present time, only the work of Bellack and his colleagues offers promise in this area. Bellack, Glanz, and Simon (4) and Rozensky and Bellack (78) found that styles of self-reinforcement may be related to success in a behavioral program that stresses self-reinforcement. High self-reinforcers (or

high "self-evaluators") did significantly better with a treatment involving self-control than they did with therapist control of treatment. Perhaps even more striking are results suggesting that high self control subjects may have actively resisted a program that emphasized external control. These investigators have identified a subject characteristic that seems to relate directly to a specific type of treatment. It is to be hoped that this type of research will help reduce the distressing outcome variability we now find in most studies.

Following Successful and Unsuccessful Subjects

Leon and Chamberlain (54) pointed out a promising procedure for the identification of important factors in treatment and follow-up. By following up a group of overweight persons who successfully lost weight, they were able to identify a number of differences among individuals who successfully maintained their loss and those who regained. Significant differences were found on items having to do with between-meal eating, types of snacks eaten, frequency of activities inside and outside of the home, and reports of hunger after eating an adequate breakfast. In another study, they found that "regainers" tend to eat in response to a variety of states of emotional arousal, while "maintainers" report eating more specifically to feelings of loneliness and boredom (55).

This approach should be very helpful both in refining treatment programs and in developing more effective follow-up strategies. By careful process observation, we should gain a much better idea of just when and where our treatments break down.

Cost Efficiency

Pointing to the increasing levels of expenditures for health-related treatments and tighter economic conditions in both the public and private sectors, Yates (95) tells us "it may be as important to measure and decrease the cost of obesity treatment as it is to measure and increase its effectiveness." Very little has yet been done in this area, but a study by Jeffrey and Christensen (46) represents a start. These investigators compared the results of their behavioral treatment program, involving only 14 hours of patient contact time, with another program involving an average of 54 hours of contact time per patient, and found the two treatments to be equally successful. Jeffrey and Christensen (46) acknowledge the difficulty of making such comparisons because of the different populations involved; nevertheless, their observation that "some treatments may be more efficient than others" merits consideration. We are a long way from knowing what the most efficient programs might be.

Learning or Performance?

Throughout the literature on the behavioral treatments of obesity, there has been a strong emphasis on having the client "develop" skills or "learn" new behaviors that will be conducive to weight loss. This emphasis ties in with the etiological notion that obesity is the result of "learned" inappropriate eating habits. Several investigators have questioned the role that lerning plays in our treatment programs. Hall et al. (35) found that at a six-month follow-up "virtually all of the subjects . . . reported that they no longer used any of the techniques taught them." If learning was going on during treatment, practice was evidently not complete enough to establish firm habits. Jeffery, Wing, and Stunkard (44) also questioned the role of learning within an ongoing treatment program. They reasoned that "if behavioral approaches achieve their results through incremental learning, weight losses should accelerate. Initially, when few changes have been made, losses should be slow; later, with the learning of additional skills, losses should be more rapid." Their data, however, showed the opposite of their predictions. Weight loss was greatest at the beginning of the program, and a gradual decline in rate of loss was seen as the program progressed.

These results provide little substance for theoretical speculation, but they do suggest that current procedures might be construed as "motivators" for the performance of behaviors already known, rather than exercises in the "relearning" of eating behaviors.

A SUMMARY STATEMENT

It has recently become fashionable to knock behavioral treatments of obesity. Perhaps because they have not lived up to the great promise they once seemed to hold. Perhaps because iconoclasts have always gotten more than their share of attention. Perhaps because we research types are a crusty, critical lot. Whatever the reasons, we should not overlook the good aspects. The behavior modification movement has given us a better, albeit still imperfect, treatment for obesity. There are large numbers of individuals whose psychological and physical health has been greatly enhanced by the treatments reviewed in this article. I must agree with Mahoney and Mahoney (60), who remind us that "we remain a long way away from any semblance of justification for complacency in weight regulation," but a broad look at the literature makes me grateful for what has been accomplished and still hopeful for more progress in the future.

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CHAPTER 4
Eating Styles: A Developmental Overview

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Recent comparisons between the eating styles of normal and obese children have shown that obese school-age children may have a significantly different eating style than the nonobese children (3, 9). Studies of adults' eating behavior, on the other hand, have been somewhat less conclusive. Contradictory findings have been reported recently, with some researchers finding the obese have faster eating rates (6, 9, 10) and others reporting the absence of an increased eating rate (1). The importance of establishing the existence of the presumed differences in eating style is related to the validation of the behaviors selected for modification. In other words, we need to determine if the eating behaviors frequently selected for modification are in fact different in the obese and the normal. This is the first step in establishing the validity of the "eat more slowly" instructions found in behavioral programs (7, 11, 12). Additionally, there is the potential of using naturally occurring differences in eating styles as a means of identifying and following infants and children at risk for obesity. For these and other reasons, we have begun a series of studies designed to isolate and measure the differences in the eating styles of obese and normal children.

In the following pages, we will present the results of our first two experiments and the results of an experiment conducted by Engen, Lipsitt, and Robinson (4). Conclusions that can be drawn and subjects for future research in the area will be identified. Additionally, some potential prophylactic measures will be proposed vis-à-vis the differences in eating rates that have been measured.

The target behaviors observed in both studies (2, 3) were the following: First, bites per interval observed; second, chews per interval observed; third,

sips per interval observed; and fourth, number of talks with a peer per interval observed. Finally, an additional variable called chews per bite was calculated by dividing the total number of chews by the total number of bites. The observational method used in both studies was a time sampling procedure in which the subjects were observed for 30 seconds on, 30 seconds off until 10 intervals of observations per subject had been collected or the observation procedure had been otherwise terminated. The criteria for termination of the observation procedure were the following: (1) subject finished eating, (2) subject was blocked from the observer's view, (3) subject detected the observation, and (4) 10 sample intervals were collected. A subject was considered to have finished eating when two consecutive intervals with no eating or drinking occurred. Reliability data were collected on 20% of the preschool subjects and 11% of the school-age children. Interobserver reliability was very high, ranging from .88 to .99 in both studies and for all variables observed. Additionally, no indication of systematic observer differences were found in the analysis of data.

Naturally, consumption of soft foods such as jello or mashed potatoes was excluded from the measurement procedure because of the potential for inflation of the obtained bite rates. It should be noted that in our studies all children received a standard cafeteria lunch, thus further increasing the validity of intersubject comparisons. The observation procedure defined a bite as any taking of food into the mouth, and a chew as any masticatory action of the jaws. In both of these studies we did not make an attempt to determine either the amount placed into the mouth per bite or the total amount eaten during the entire meal. There are two ways of increasing the rate of eating. One is to increase the number of bites per fixed interval of time, and the other is to increase the amount ingested with each bite. Bite size in adults has been found to be related to body weight in obese females but not in males (1). Accurate assessment of this means of increasing eating rate in children will be the subject of future research.

The subjects studied in the elementary school study were 120 children enrolled in seven public schools. The subjects were classified by two observers separately as having the same weight, race, and sex. The children in the preschool sample were 30 overweight and 30 normal-weight children ranging in age from 18 to 72 months. Children in the kindergarten study who were classified as overweight by the observers averaged the 85th percentile of weight for height.

The findings from these studies indicated that there were systematic differences in the eating rates of the obese and the average-weight children. Specifically, we found that the obese took significantly more bites per observed interval than the nonobese subjects. We also found that the rate of chewing was significantly related to the age of the children in the preschool age sample, and the weight of the subjects in the elementary age sample. The

calculated variable, chews per bite, was significantly related to weight in both studies, with the obese showing an apparent tendency to take fewer chews per bite than the normal weight subjects (see figure 1). The sex effect which we found in the elementary age sample was not replicated in the younger sample. Moreover, neither study found a significant relationship between weight or sex and the sip rates observed. Finally, the variable talk rates per observed interval were related only to age of the subjects, as would be expected from the developmental trend of increasing verbal ability with age. We will discuss this failure to find a difference in talk rates in more detail later. To summarize the findings, it appears that by the age of 18 months, overweight children have already developed a distinctively different eating style from that of lean children. The finding of a significant difference at 18 months of age is especially interesting, since this is the age at which children begin to feed themselves independently, rather than being fed by a caretaker. This "obese eating style" was consistently characterized across the ages sampled by an increased bite rate and a decreased rate of chews per bite.

Scrutiny of the intercorrelations between the measures of eating rates used in our studies revealed several interesting findings (see Table 1). It appears that the correlations found between the bite rates and both the chew rate and the chews per bite rate may possibly reflect two factors. First, they may

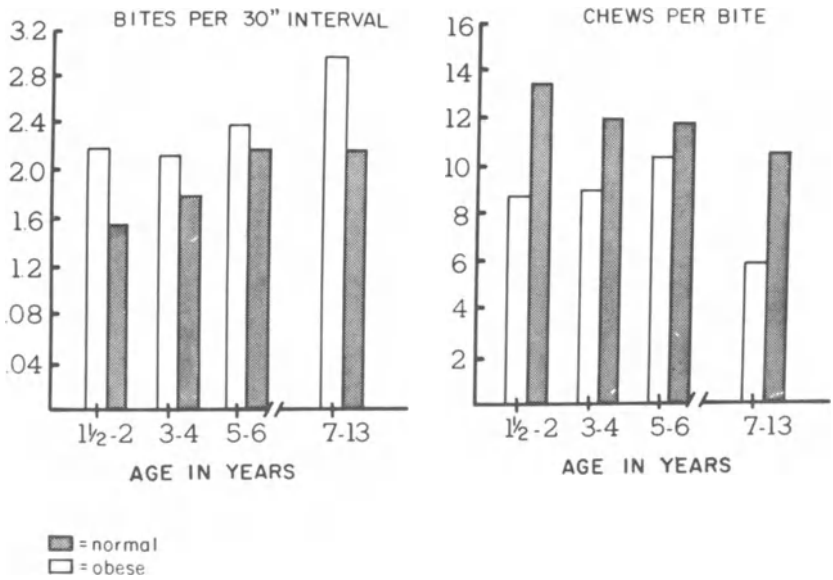

Fig. 1. Mean number and standard error of bites/30 second interval and chews/bite across ages.

TABLE 1
Intercorrelations of the Dependent Variables For Preschool and Elementary School ( ) Data

	Bite Rate		*Chew Rate*		*Sip Rate*		*Talk Rate*	
Chews/bite	-.67**	(-.48**)	.22	(.59**)	-.02	(-10)	-.03	(-.10)
Bite Rate	—		.47**	(.37**)	-.19	(-11)	-.13	(-.27*)
Chew Rate	—		—		-.27*	(-24*)	-.10	(-.28*)
Sip Rate	—		—		—		.30*	(-.19)

*$.01 < p < .05$
**$p < .01$

indicate the necessary covariation of the eating behaviors, i.e., it is impossible to take a bite of solid food without subsequent chewing. Additionally, it is apparent that higher and lower chewing rates will be to some degree correlated with the amount of eating that can be accomplished in a measured interval, i.e., high chews per bite rates, lower bite rates, and vice versa. The slight negative correlation found between sip rates and chewing rate may indicate an elimination of chewing time in order to make time for a sip from a drink. This small negative correlation was evident in both the preschool and the elementary school age children, which was not the case for the weak positive correlation found between sip rate and talk among the preschoolers.

Interestingly, a study conducted by Engen, Lipsitt, and Robinson (4) has extended downward the weight-related differences in eating style to almost the moment of birth. The subjects observed were 96 neonates of weights ranging from 2.8 to almost 5 kilograms. Observations were carried out when the infants were no more than 20 to 94 hours of age, an age at which it is difficult to argue that postnatal learning could have had a role. Observations were carried out by means of a nipple containing a pump which was activated by a pressure-sensing device. Each suck produced a measured quantity of sugar solution at 3 concentrations of pure water. The study found a moderate but significant correlation between the rate of sucking and the infants' birthweight for the sugar solutions. The correlation diminished below significance when only water was delivered through the nipple. The results of the study indicate that the difference in eating rates between the obese and the nonobese may be present by the time of birth. The next step should be, first, to allow the neonates to suck as much as they want to in each suck and, second, to compare groups of children who are above the 85th percentile, at the 50th percentile, and below the 15th percentile of weight for length. Such a comparison would allow for the assessment of the relative contribution of these variables to the moderate correlation found in the Engen et al. study, and it would also allow the significance of the differences between the obese and the normal-weight infants to be determined. A comparison between normal-weight and lean infants' eating styles could also be carried out, since the lowest weight in the Engen et al. study (6.1 lbs) indicates that no very small-for-term infants were included.

There are several prophylactic and research recommendations in relation to these differences in the eating style of obese and nonobese children. It appears that since the correlation exists at least from birth through the sixth grade, this may be a feasible means of identifying and following longitudinally the group of infants and children who may be at the highest risk for becoming or continuing to be obese. In particular, the fact that the eating style differences are reliable argues for their possible use in lieu of or in addition to more traditional methods such as relative weight, weight for height, or skinfold measures. However, before full confidence can be placed

in the differences in eating styles which have been discovered, it will be necessary to conduct longitudinal studies in which children with extreme and normal eating rates (slow, normal, and fast) are followed into adulthood. If it turns out that the eating rates are a potent predictor of future obesity, normal weight, or leanness, their use as a screening variable will have been justified. This is especially so in view of the ease and reliability with which bites and chews can be observed in children.

The findings discussed in this section would potentially justify prescriptions to alter the structure of the school lunch period. Since it appears that obese and overweight children eat at a faster rate, it would seem logical to encourage them to alter their eating style to one that is congruent with normal body weight. As presently structured, lunch periods are brief and often followed by a recess period. Thus, there is always institutional encouragement of rapid eating by means of short allotted eating times. Additionally, there is frequently a reward for fast eating in the form of an extension of the postlunch recess for children who finish their meal rapidly. These appear to be structural and reward conditions that reinforce the obese eating style in children. A more rational approach may perhaps be one in which many actions are combined to encourage the altered eating styles. First, a longer lunch period should be allotted to the children. In addition to more time being provided, its full use could be encouraged, perhaps by mandating that cessation of eating would immediately be followed by a study period. Since a study period would always follow the lunch period, and no seconds would be available, rapid termination of the meal would only lead to an increase in the time which the children would have to spend studying, an activity which few children find rewarding. An experimental evaluation of whether such a procedure would be effective in teaching children to "dally" over their food would be interesting.

Modification of eating rates in younger infants would require more imaginative solutions. Infants and bottle-fed toddlers could perhaps be treated by making the sucking response more laborious, which would decrease the rate of food ingestion. A simple method for implementing this procedure is to use a narrower nipple hole for obese infants. For older, spoon- and cup-fed children, it would be best to rely on maternal education. The mother is clearly the ideal person to control the rate at which a child consumes food *and* the amount the child ingests per bite. Smaller spoonfuls and longer periods between spoonfuls may, over the long run, modify the child's inappropriate style of eating.

The importance of early intervention is pointed out by the results which we found in obese elementary school children. These children showed a significantly lower rate of chews per bite which was characterized by reduced variability when compared with the data from the younger children. The lower proportionate variability for the obese in their reduced level of chewing for each bite, which was observed in both populations, may in fact indicate that the overweight have established a pattern of quickly disposing of each

bite in order to "rush on" to the next one. This finding implies that by elementary school, fast eating patterns may be stabilized and less amenable to change. Again, the degree to which the recommendations for future action would be effective in modifying children's *ad lib* eating rates is an empirical question that can only be answered by further research.

An interesting finding in both the elementary-age and preschool-age children is the fact that there were no differences in talk rates as a function of weight. There are several conclusions that can be drawn from this finding. First, as mentioned previously, the fact that the only significant relationship was between talking and age level indicates that the controlling variable may be simply maturation of speech abilities. Another conclusion that may be drawn from the finding of no weight-related difference is that there may be few social consequences for being fat in the preschool and elementary school years. Lerner and his associates (8), among others, have suggested that obese children develop negative self-concepts, possibly as a function of greater interpersonal distance between them and their peers. This increase in interpersonal difference comes about from their less-pleasing appearance. Lerner et al. are clearly not equating interpersonal distance with lack of verbal communication. However, we should remember that other researchers (5) have demonstrated that dyadic speech in preschool children may be distinctly social in nature. It is thus possible to assume that talking rates may be a reasonable analogue measure of social interaction rates for younger children. Our failure to find such negative social effects of obesity may only indicate that the ostracism occurs in other settings or at later ages than preschool or elementary school years.

Overall, it is apparent that both our study and that of Engen, Lipsitt, and Robinson indicate that the differences in eating behavior which are thought to be pathognomonic of obesity in older subjects are present at birth and seem to stabilize with increasing age. The finding of marked differences in neonates is especially significant, as it may be indicative of an inborn difference rather than a learned difference in eating style. It is not known at present whether Engen et al.'s results will be replicated. It is also not clear whether the finding of apparently innate differences in eating style for obese vs. nonobese infants has any treatment significance. In the absence of such evidence, we must proceed on the assumption that our treatments to reduce the eating rates of overweight and obese children may be effective. Furthermore, the finding of early differences clearly justifies aggressive early intervention studies designed to head off the development of obesity in later life.

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CHAPTER 5
Treating Obesity in Children and Adolescents: Is There Any Hope?

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Obesity is basically unfair. Excessive fat tissue was clearly advantageous in protecting our active ancestors from cold weather, recurring food shortages, and protracted illnesses. Contemporary society, however, provides attractive food in abundance and requires little physical exertion in return. Consequently, losing weight or maintaining a relatively lean body can be a formidable challenge. The average American adult is 20 to 30 pounds heavier at age 50 than he or she was at age 21 (16). Obese or overweight children and adolescents may suffer even more. Once overweight, they are likely to remain that way throughout life. Eid (14) observed that 20% of infants whose weight exceeded the 90th percentile at six weeks, three months, or six months of age were overweight when six to eight years old as compared to 7% of average or slow weight gainers. Charney et al. (9) found that 36% of infants whose weight exceeded the 90th percentile were overweight adults as compared to 14% of the average and lightweight infants. Lloyd, Wolff, and Wheeler (31) noted that 75% of the children who were overweight at 9 to 11 years of age were still overweight eight years later. Abraham and Nordsieck (1) reported that 80% of those overweight at ages 10 to 13 were still overweight at ages 26 to 35.

Adding insult to injury, we abhor obesity and prize leanness. Obese children and adolescents are less accepted by their peers, experience more discrimination from significant adults, have greater body image disturbances and poorer self-concepts, and evidence disturbed personality characteristics to a greater degree than their normal-weight peers (cf. 11).

Altering cultural values could be an acceptable solution if obesity were no more than a cosmetic problem. However, evidence from a variety of sources

suggests that obesity, even among children, may be associated with an increased risk for a variety of health problems such as hyperinsulemia, carbohydrate intolerance, elevated blood pressure, and elevated triglycerides (30, 36, 45).

We approach the problem of overweight and obesity among children and adolescents within the larger context of concern with primary prevention of cardiovascular disease. Evidence is converging from a variety of sources to suggest that young persons show beginning signs of increased risk. Glueck, Falat, and Tsang (20), for example, estimate that 50% of American males may be predisposed to atherosclerotic cardiovascular disease by age 20. They suggest that this increased risk can be traced to the presence of elevated risk factors in youth. In a series of population studies with children, 8% to 25% have shown elevations in lipid cholesterol (20), while 1 to 36% have shown elevated systolic and dyastolic blood pressures (28). Smoking rates among 15- and 16-year-olds are estimated to be 18.1% for boys and 20.2% for girls, climbing to 31.0% for boys and 25.9% for girls in the 17 to 18-year-old range (U.S. Public Health Service, 1974). The diets of children and adolescents appear to share the same deficits and excesses characteristic of the entire population: Over 40% of the calories ingested are from fat, saturated fat accounts for 15% to 18% of the calories eaten, and dietary cholesterol is in excess of 300 mg per day (15, 17, 18, 55). Finally, by the time they reach adolescence, young persons are quite sedentary (23). Preventive and remedial programs directed at youth for a variety of health problems are clearly needed.

The programs available for reducing obesity among children and adolescents share one common but unfortunate feature: They are relatively ineffective (11). Standard dietary and exercise counseling, even when combined with anorectic drugs, results in significant weight loss only for a small minority of participants. Organized exercise programs in schools (38, 42), structured summer camp settings, and enforced starvation in hospitals (40, 44) have produced some impressive immediate weight losses. These losses are rarely maintained, however, once participants return home.

These approaches have failed to recognize the obvious: Eating is influenced by events in the immediate physical and social environment. Returning to friends, family, and familiar settings prompts a return to former eating and exercise patterns as well as to former weight. Why? Because the person has not learned how to alter those events and circumstances that influence eating and physical exercise in everyday settings where food is all too available and attractive.

Persons who experience chronic difficulty in managing eating and exercise patterns need more than advice in how to live a healthy life. Foregoing immediate pleasure for intermediate and long-range benefits requires that persons learn *skills* for regulating eating and exercise patterns; use those skills

to bring problem behaviors under control; and continue to use those skills as needed to maintain progress.

These issues have even broader implications: By what processes do people in general, and children and adolescents in particular, expend effort and experience deprivation to achieve personally meaningful goals?

By what processes can these skills be taught, and their use maintained? Essentially, these are questions of self-control processes and procedures (cf. 35, 53).

BEHAVIOR THERAPY: A NEW HOPE?

Behavioral approaches are designed to help persons alter eating and exercise behaviors by variables believed to influence food selection and activity patterns. Strategies typically involve monitoring the quality and circumstances of eating, restricting the range of cues associated with eating (e.g., eating only at certain times and places, not eating when engaged in other activities), altering the act of eating (e.g., eating more slowly, eating bulk foods first), changing physical and social cues associated with eating (e.g., altering how food is stored, reducing stressful interactions with family members at mealtime), and systematically using rewarding consequences for change (e.g., setting up a point system and positive events for reaching subgoals). Applications to date with children and adolescents have been few but somewhat promising.

Aragona, Casady, and Drabman (2) reported promising short-term results with five- to ten-year-old females. Parents were trained in nutrition, exercise, and methods for altering the physical and social environment at home. A financial deposit was refunded weekly to the family for attending group meetings, completing homework assignments, and when children achieved weight loss goals. One group of parents was also trained to reinforce habit changes in their children; a third group served as a no-contact control. Both experimental procedures produced clinically significant short-term losses during the 12 weeks of treatment (reinforcement $\bar{x}$ = 11.3 lbs lost; no reinforcement $\bar{x}$ = 9.5 lbs lost); control group subjects showed a mean gain of 0.9 pounds.

Wheeler and Hess (54) used an individually tailored behavioral program with two- to ten-year old children. Mothers and children were treated in pairs; programs were tailored to individuals based on a careful behavior analysis; and gradual changes and long-term involvement were emphasized. After seven months of treatment, 14 children showed an average 4.1% reduction in present overweight, 12 program dropouts gained an average of 3.0%, and 14

no-treatment controls gained an average of 6.3%. Variances and follow-up data were not reported.

Gross, Wheeler, and Hess (21) treated 10 obese adolescent girls in 10 weekly sessions which included self-monitoring, rearranging the physical and social environment, nutritional information, and problem-solving. At the end of 10 weeks, 3 had lost more than 15 pounds, 3 had lost 2 to 8 pounds, and 4 subjects had maintained or gained. At 27 weeks the following were observed: Of those maintaining or gaining immediately following treatment, 3 continued to gain while one girl lost 10 pounds; those who lost 6 to 8 pounds initially continued their loss with a range from 6 to 14 pounds; and those who initially lost 15 or more pounds reported total losses which ranged from 21 to 40 pounds. Continued success seemed to be predictable from the degree of weight loss experienced during the 10-week program.

These outcomes represent helpful leads rather than final solutions. Although behavior therapy has been lauded for results with obese adults (cf. 27, 50, 51), it is important that its limitations and deficits not be overlooked. Behavioral treatment of obesity with children and adolescents has produced outcomes similar to those achieved with adults: *Some* beneficial changes are achieved with *some* persons. Maintenance of change or continued losses are still the rare exception (cf. 25, 57). The caveat is clear. Current behavioral strategies offer promising possibilities; unguarded optimism is unwarranted. Continued research using more divergent conceptual and methodological strategies is necessary to achieve clinically meaningful and lasting outcomes with children and adolescents.

PROCESSES AND PROCEDURES IN WEIGHT REGULATION

The earliest behavioral weight-loss strategies represented a blend of operant (the external environment utlimately controls behavior) and social psychology (obese persons are more responsive to external cues and less responsive to internal cues than nonobese persons) (cf. 41). Treatments built upon this model were designed to modify the external environment to reduce food cues, the rate of eating, the amount and size of portions, and, as a result, food intake in general (46, 49). Although clients themselves could be instrumental in producing some of these environmental changes, all changes in behavior (even those apparently initiated by the person) were explained in terms of changes in the external environment (cf. 48).

The next generation of strategies relied more directly on research in behavioral self-management (cf. 53). From this perspective, persons themselves are taught specific self-control skills to use in modifying their own internal and external environments as ways to alter their food intake and physical activities. The emphases in treatment programs changed even if

specific strategies did not. Self-management programs were designed to help persons (even children and adolescents) become aware of and modify social and physical antecedents of eating, to self-administer rewarding consequences for habit change or weight loss (5, 26, 32), or to self-administer aversive stimulation for food cravings (cf. 39). Self-management programs began to place more emphasis on cognition as well. Explicit training was introduced to help persons modify thoughts and beliefs that interfered with adherence to weight control strategies (33, 34) and produce self-reinforcing thoughts contingent on attainment of weight loss or habit change goals (5).

The behavioral self-management perspective has been helpful in focusing more attention on internal cognitive processes and personal resources available to influence the environment. This emphasis has helped the field move away from an exclusive focus on the external environment. However, self-management approaches may have moved too far. They often appear to place an excessive burden on the individual, operating on the assumption that persons can and will use specific self-management skills successfully when they have been presented in a 90 to 120-minute lecture in a consulting room once a week for 10 to 20 weeks. Persons teaching these strategies seem to have forgotten that lecturing is relatively inefficient for teaching new skills when compared to modeling and guided practice (cf. 3). In emphasizing self-directed change, therapists have often neglected the importance of the external environment (physical and social cues, and social and material reinforcement) as a powerful means to promote the practice of new and difficult behaviors (cf. 24), or as an unrecognized factor that inhibits change.

These strategies also suffer from the lack of a unifying theoretical rationale. Current weight-loss programs have chosen to link components rather than to develop programs from a theoretical understanding of regulatory processes (cf. 3). Instead of continuing in this theoretically *ad hoc* fashion (sometimes defended as technical eclecticism), added benefit may be best obtained by focusing more research on the processes underlying weight regulation. New perspectives and improved understanding of regulatory processes are needed *before* we can develop more clinically useful weight-loss procedures.

Social Learning Theory and the Reciprocal

The reciprocal model presented in Figure 1 is designed to counteract the imbalances created by an overemphasis on either internal or external factors and to provide the outline of a unifying theoretical rationale from which to develop effective treatment programs (cf. 4, 12). This interactive system includes the *person,* the physical and social *environment*, and the person's *behaviors.* Influence is multidirectional. For example, an obese adolescent male may have learned specific weight-loss skills such as declining food offers

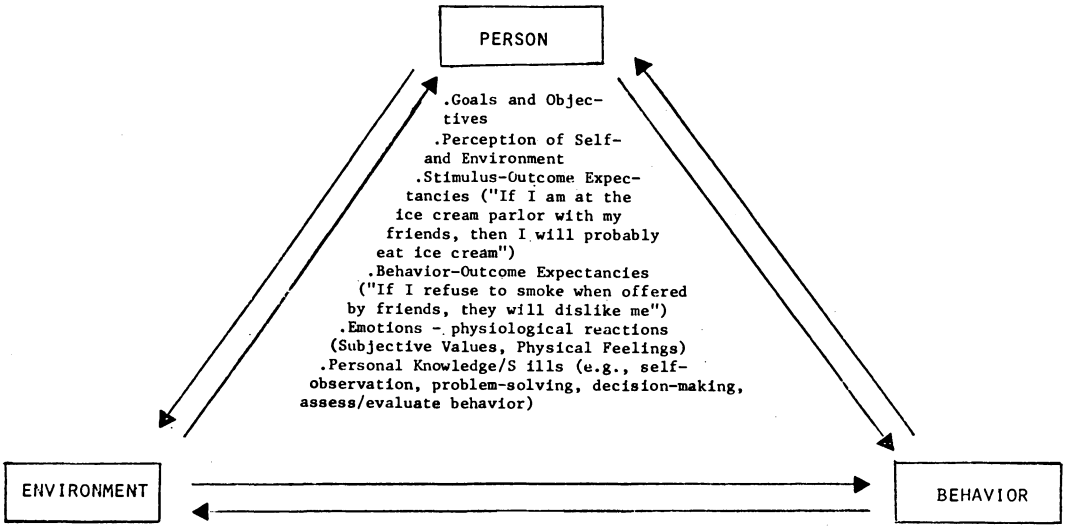

Figure 4. The person, behavior, and the environment in a reciprocal interaction system. Each element of the system can influence and be influenced by each other element. For example, a food advertisement on television (the environment) might stimulate certain thoughts (e.g., "I'm hungry," "Sugar-coated cereals are nutritious") prompting the person to eat certain foods when not hungry. Behavior can also influence the environment and the person. Turning off the television (behavior) eliminates the tempting stimulus (environment) and also may encourage feeling of mastery over thoughts and actions (person).

from insistent grandparents or friends. These skills may not be used, however, unless environmental conditions support their use, e.g., encouragement from parents, the promise of financial reward, frequent contact with therapist, etc. Once this person actually performs a difficult action with support from the environment, he may begin to evaluate his abilities differently. Changing from a sense of impotence, he may begin to have thoughts like, "I am the kind of person who can control what I eat."

Table 1 lists some environmental, personal, and behavioral factors influencing learning and performance based on this reciprocal social learning perspective (cf. 3, 37). A distinction is made between learning (what has the person learned to do?) and performance (what will a person do in a specific situation?). The person learns specific behavioral skills, e.g., how to perform specific actions and sequences of behavior, and also specific cognitive skills, e.g., ways to process information, through direct experience and by observing others. Television, radio, and books provide the opportunity to be vicariously exposed to a wide variety of models and experiences. Incentive conditions can promote learning; physical and cognitive development may set limits on what can be learned.

Contrary to Socrates' dictum, however, knowledge is not virtue. Performance does not occur simply because a person knows what to do. Consider again the example of the overweight adolescent male enrolled in a weight-loss program. "Methods for refusing offers of food," a specific lesson in that program, may be taught via role models on videotape and through guided practice with other group members. Whether the person uses this skill in a specific situation depends on current interactions among the environment, the person, and his performances. Specific physical and social cues might occur first, e.g., grandparents offer food at dinner. The person *interprets* these cues in terms of their meaning and significance to him, e.g., "If I accept now, my grandparents will continue to offer me food." Specific actions follow in response; he tells his grandparents, "No thanks, I'm full." His parents support his refusal by telling the grandparents how well he has done in the weight-loss program. These actions can also influence the environment—e.g., future offers may be fewer in number—as well as the adolescent's beliefs about his abilities to lose weight. Such beliefs are, of course, validated when the environment (e.g., the bathroom scale or a significant actual or potential friend) "tells" the adolescent that he has indeed lost weight.

Methods for weight reducing will be effective (generally potent, maintained across time, and generalized across settings) to the degree that they help the person acquire skills for managing behaviors in specific situations and provide the necessary conditions for helping the person use those skills when needed. Behavioral strategies for treating obesity among children as well as

TABLE 1
Some Variables Influencing Human Actions:
Social Learning Perspectives

LEARNING: WHAT HAS THE PERSON LEARNED TO DO?

- Person learns specific actions by direct experience and by observing models; incentive conditions may promote learning; physical and cognitive development moderate what can be learned.
- In response to specific environmental conditions, the person engages in specific behaviors:
  - — the person specifies the behavior to be performed and also the performance level that will be considered adequate according to personal standards.
  - — the person then engages in the behavior, drawing upon organizing rules for sequencing complex behavior postures.
  - — the person evaluates personal actions using personal standards and those provided by the environement.
- Includes learning about structure of the physical world, social rules and conventions, personal constructs about self and others.
- Includes cognitive processes: the ways in which information is perceived and processed; methods by which behavioral sequences are committed to memory; sequences of behavior retrieved in specific situations.

PERFORMANCE: WHAT DOES A PERSON DO IN A SPECIFIC SITUATION?

Environment

- Antecedent stimulus conditions signify events to come and indicate probable consequences that can be expected when specific actions are performed.
- Reinforcement conditions indicate what the person must do to gain positive outcomes and avoid punishing outcomes.
- Provides standards against which to judge personal performance and incentives to perform according to personal standards.

Person

- The environment influences a person through cognitive mediation—what does the stimulus mean to the person?
  - — e.g., stimulus-outcome expectancies: based on past experiences, person makes predictions about relations between stimuli and events to come.
  - — e.g., behavior-outcome expectancies: based on past experience, person makes predictions about alternative actions open to him or her and the probable consequences of each.
  - — e.g., subjective values: emotional values associated with environmental stimuli or by available courses of action.

Behavior

- Specific actions influence the social and physical environment.
  —e.g., if person refuses food consistently, other persons will stop offering it.
- Specific actions influence the person's beliefs and attributions.
  —e.g., behavior-outcomes expectations may change; evaluations of personal abilities may change.

adults have devoted considerable attention to developing methods for helping persons acquire weight loss skills. Their limited record of success, however, may be due to the relative neglect of methods for helping persons use these skills (cf. 11, 24, 57). Currently we are attempting to bridge the gap between learning and performance by applying this reciprocal interaction model to the treatment of obesity among children and adolescents. We are mindful of the double-edged nature of any conceptual model. On the one hand, a model offers a structure for clarifying the quagmire of experience and "fact." On the other hand, any theory blinds one from certain experiences. Theories need to be taken seriously, but perhaps not for too long (52).

THE STANFORD ADOLESCENT OBESITY PROJECT

Table 2 outlines the steps in our research into methods for treating obesity among children and adolescents. The first two steps led us to five conclusions: It made little sense to continue the routine application of dietary, medical, or enforced compliance procedures already found to be ineffective; close examination of outcomes revealed that behavioral treatments produced weight losses that were highly variable and poorly maintained; obese persons generally cannot be characaterized by a uniform "eating style"; the conditions supporting overweight for each person may be different; studies of regulatory processes were needed to clarify theoretical issues and clinical procedures; a variety of research designs and measurement strategies were needed to examine these processes and procedures (10, 11, 24, 57).

Prototype Treatment Program

Table 3 outlines the prototype treatment program designed to incorporate the insights obtained from the preliminary analyses and clinical trials. The program was designed to use multiple processes to promote personal regulation of eating and exercise habits. The participants met twice weekly with a therapist for approximately one hour each time. Lecture and modeling plus guided practice of behaviors were employed to teach the skills outlined.

Self-observation, nutrition, problem-solving, cognitive environment, and self-instructions were designed to modify directly the *personal* sources of influence in the client's life. Cue elimination, contracting, and physical and social support, by contrast, attempted to provide powerful inducements to perform the weight regulation skills taught in the program. During the first five weeks of the program, the therapist met once weekly with *all family members* in clients' homes to increase the probability that the environmental supports would be used.

TABLE 2

The Stanford Adolescent Obesity Project

Focus		*Research Design*	*Results*	*Implications*
1. Review General Literature:	Examine the efficacy of methods used to treat childhood and adolescent obesity.	Studies rated according to specific criteria (treatment program description, degree of weight change for individual subjects, clinically significant short- and long-term change, replicability).	Treatments are not effective in promoting clinically significant short-term changes; no evidence of maintenance beyond treatment period; Research designs inadequate for developing effective treatments.	Need to develop effective program using careful research strategies.
2. Review Behavioral Studies:	Examine the efficacy of behavioral treatments for obesity.	Studies rated according to degree of variability among subjects, clinically significant short-term results, maintained losses, behavior change.	Behavior therapies produce highly variable and poorly maintained weight losses; Treatments too short in duration; no evidence that treatments lead to changes in eating and exercise behaviors.	Need to reduce variability, promote maintenance; measure relationships among program components, behavior changes, and weight losses.
3. Conduct Clinical Case Study:	Develop and pilot test a treatment program.	Intensive single-case clinical trial (one 15-year-old male).	Steady weight loss during treatment and after termination of frequent contact change in food preference, eating habits, and exercise behavior.	Attempt to replicate across subjects and therapists in clinical setting.

4. Conduct Single-Group Study:	Attempt to replicate results of clinical case study and develop treatment program further.	Small group clinical trial (no control group) (eight 11 to 17-year-olds).	Highly variable weight losses among subjects; overall change not clinically significant.	Possible variables affecting degree of weight loss: 1) extensive and continuing family support. 2) strong and powerful reward systems for weight loss and habit change. 3) younger children need more structured environments. 4) need to focus on changing beliefs and thoughts about food and weight loss.
5. Methodological Study:	Determine reliability of procedure for measuring client eating behaviors in their homes.	Generalizability Study 2 × 3 × 4 anova design (three 16-year-old females).	Reliable data on most variables can be obtained with 3 observations per subject.	Use in clinical practice for assessment and in controlled research to determine treatment effects.

6. Treatment Evaluation:	Evaluate multicomponent treatment program; examine relationships among program components, behavior changes, and weight losses.	Intensive experiment (time laggered, multiple baseline) (three 16-year-old females).	a. Behavior changes occurred with introduction of program components. b. Variable behavior changes among subjects. c. Treatment program effective beyond results attributable to placebo.	a. Ned to streamline treatments; tailor to deviant eating patterns. b. Need to develop more extensive measurement procedures to assess social and cognitive variables. c. Need to develop and validate less expensive measurement procedures.
7. Group Treatments:	Evaluate efficacy of self-control treatment administered in groups; importance of family support.	Group factorial: Group 1: Total treatment program and parent involvement; Group 2: Total treatment program, no parent involvement; Group 3: Self-monitoring control (twenty-one 14 to 16-year-olds).	Minimal and highly variable weight loss.	Need to develop methods for ensuring client and family adherence to program.
8.	Evaluate efficacy of frequent contact and incentives for weight loss and habit change.	2 × 2 factorial: contact (daily vs. weekly) × reinforcement (weight loss vs. habit change)	Daily contact + reinforcement for weight loss produced clinically significant short-term results	Study maintenance; Develop procedures for reducing variability among subjects

From Carl E. Thoresen and Thomas J. Coates "What Does It Mean to Be a Behavior Therapist?" *The Counseling Psychologist,* 1978. Reprinted with permission.

TABLE 3
Prototype Treatment Program

Component	*Skills*
Introduction	Reason for overweight. Importance of eating habit change. Rationale for learning self-control skills.
Self-observation	Record food intake. Record environmental and cognitive events associated with food intake.
Cue elimination	Eat only at designated eating place and at specific times. Refuse food offers. Eliminate other activities (e.g., reading, watching television) while eating.
Nutrition*	Discriminate food quality (i.e., protein, carbohydrate, and types of fat). Discriminate high, medium, and low calorie foods. Modify food quality—substitute low for high calorie foods and increase balance among food types.
Problem-solving and Self-instructions	Identify and recognize problem eating situations. Learn self-verbalizations for guiding behavior in those situations. Implement and test.
Contracting*	Set personal eating habit change goals. Rearrange cognitive, social, and physical environments. Select and administer personal rewards. Establish reward and point system with parents.
Physical support	Food stored out of sight and in opaque containers. Food platters left in kitchen. Low calorie and high quality foods served at family meals.
Act of eating	Fork down following each bite. Two-minute delay in the middle of the meal.
Cognitive environment	Recognize "fat" thoughts (i.e., thoughts subverting motivation to use habit change techniques). Substitute "thin" thoughts (i.e., thoughts promoting eating habit change).
Social support*	Family praises eating habit changes. Food talk eliminated from everyday conversation. Food-related interactions reduced. Food not offered to client.
Food portions	Use smaller plates and bowls. Leave food on plate. Reduce amount of food taken.
Exercise	Begin systematic exercise program. Becoming less "efficient" (e.g., park car far away, take stairs instead of elevator).
Problem-solving/* Maintenance	Plan for future problem eating situations. Substitute other activities for eating. Review components and application.

*Sessions conducted in clients' homes with entire family present.

Evaluation

Two specific research questions were explored in this experiment: What changes in weight occurred, and what changes in eating habits took place with this self-management treatment program (cf. 13). We used an intensive research strategy to examine functional relationships among treatment components, to monitor changes in eating habits and weight loss to study the pattern and stability of behavior changes over time (cf. 22). A multiple baseline experimental design across two subjects was employed to control for confounding variables. Initially, participants received the experimental treatment program. Treatment for the second subject in this experiment was lagged one week behind treatment for the first subject to control for possible influences of history, maturation, and the delayed reactive effects of contact and observation (cf. 8). A third subject received a placebo treatment to control for possible reactive effects of therapist contact, specific information, and the intensive observation system employed.

The subjects were recruited through an advertisement placed in local newspapers and screened for social, psychological, and medical difficulties which might impede response to treatment. Subject 1 (16 years old, 286 lbs, 65½") was 128.4% overweight at the beginning of treatment. She was the youngest of four children. Her father and four siblings were normal weight, but her mother was obese. Subject 2 (16 years old, 194 lbs, 62"), the oldest of four children, was 71.4% overweight. All siblings were normal weight but her mother and stepfather were overweight. Subject 3 (15 years of age, 215 lbs, 66"), was 72.9% overweight. Her parents were overweight but her three older siblings were normal weight.

Results and Implications

Both subjects who received the treatment program experienced clinically significant weight losses during the treatment period (cf. Figure 2). Subject 1 lost 21 pounds (16.9% reduction in percent overweight), while Subject 2 lost 11.5 pounds (10.8% reduction in percent overweight). Subject 3 gained 4 pounds by the end of treatment. These weight changes were correlated with specific behavior changes (cf. Table 4). Subject 1 reduced the number of times, places, and activities associated with eating, food portions, and the caloric densities of foods stored or available in the home. She also began and maintained a daily exercise program during the study. Changes in food preparation and service were gradual and inconsistent while no changes were seen in the rate of eating. Subject 2 showed the most dramatic changes in food preparation and service, rate of eating, and eating behaviors and food portions. Changes as a result of cue elimination exercises were limited to the number of places where food was eaten. Food buying and storage did not

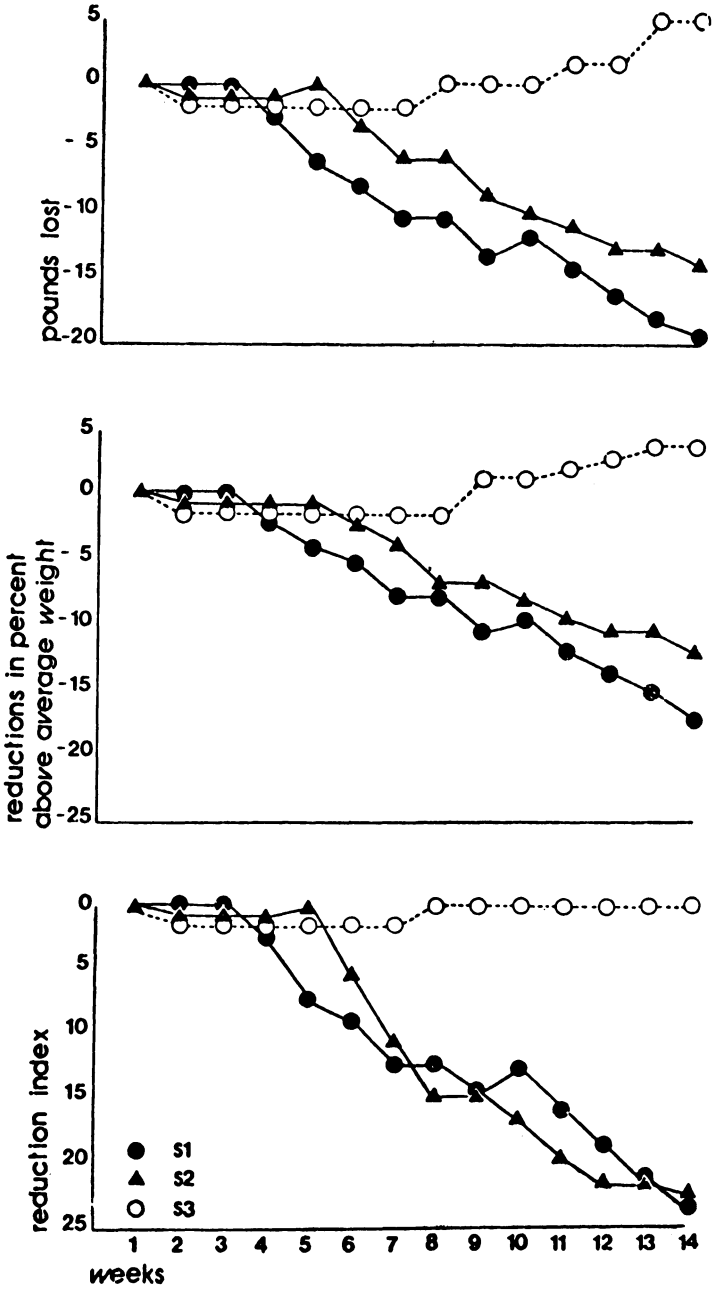

Figure 2: Cumulative Weight Change of Subject by Weeks.

show consistent or stable changes. Subject 3 showed some stabilization of weight associated with some brief but unstable behavior changes. In summary, an individualized problem-solving treatment involving the entire family seemed effective in producing powerful short-term changes in eating, exercise behaviors, and weight.

Group-Administered Family Program

The next study was less successful but equally informative.* Two questions were posed: (1) can these procedures be administered in a group, and (2) what is the relative importance of family involvement? Twenty-one subjects, recruited and screened as before, were randomly assigned to one of the treatment groups outlined in Table 5. Groups 1 and 2 received an intensive program focused on individualized analysis and problem solving. Parents of Group 1 attended some treatment sessions (marked with an asterisk in Table 5) while parents of Group 2 subjects attended the first meeting only. Group 3, which involved self-monitoring of calories only, served as an active comparison group.

Short-term weight losses in the three groups were minimal and discouraging, averaging about 4 pounds in each group. In each group, two subjects lost more than one pound per week while two or three lost only one pound per week and two or three lost nothing or gained slightly. Fortunately, negative results can be disheartening and enlightening at the same time. As many of us know, these kinds of clinical research studies require enormous amounts of time, energy, and effort. Failures, defined when clients fail to improve, are discouraging. Objectivity may increase with distance, allowing these "failures" to become informative and helpful. Our group treatment of these adolescents neglected two critical factors which were apparent in the reciprocal interaction/social learning model and which were reinforced in the clinical trials and the intensive experiment. First, we relied too much on lectures, written materials, and group discussions to teach weight-loss skills; we did not use actual behavioral practice in the group sessions as extensively as possible. Second, performance was a major problem. These participants *knew* what to do in order to lose weight, but experienced considerable difficulty in using their skills in problem situations. Including family members in the treatment sessions may have been useful, but was not a powerful enough technique to bridge the gap between learning and performance. The protracted effort needed to learn and practice difficult weight regulation skills requires more consistent environmental support than this strategy was able to provide.

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*We thank Peggie Crosbie, Susan Polly, and Julianna Rogers for conducting group sessions and for coordinating data collection and analysis.

TABLE 4
Changes in Behavior Shown by Subjects 1, 2, and 3

Skill Area	*Subject 1*	*Subject 2*	*Subject 3*
Cue Elimination	Reduced place, times and and activities, associated with eating.	Reduced places and times associated with eating.	Reduced times associated with eating.
Food Buying and Storage	Average caloric value of foods in all food storage areas was reduced during treatment.	Average caloric value of foods in cupboard and freezer reduced following treatment.	Downward trends in average caloric value of food in cupboard and refrigerator during decline; average caloric value of foods eliminated during treatment phase.
	Foods no longer left out.	Foods no longer left out.	No changes.
Food Service	No changes.	Food platters no longer on table during meal.	No changes.
Meal Duration	No changes.	Increased time eating dinner; was first to finish meal during baseline; last to finish meal following treatment.	No changes.
Eating Behaviors	No changes.	Slowed rate of eating.	No changes.
Food Portions	Reported eating more often in response to physical cues of hunger rather than in response to social situations or thoughts about food.	Reported eating more often in response to physical cues of hunger rather than in response to social situations or thoughts about food.	No changes.
Exercise	Began daily exercise program.	No changes.	No changes.

TABLE 5
Treatment Components for the Group Administered Family Program

Week	*Session*	*Groups I and II*	*Group III*
1	1	Rationale, Self-Observation	Rationale, Self-Observation
2	3	Rationale, Self-Observation	Rationale, Self-Observation
3	4	Rationale, Self-Observation	Rationale, Self-Observation
	5*	Nutrition, Setting Calorie Goals	Nutrition, Setting Calorie Goals: Monitoring Calorie Intake during Day
4	6*	Nutrition Review Contracting	Review Caloric Value of Foods
	7*	Physical Exercise Changing Food Thoughts	Check Food Diaries
5	8*	Family Support Changing Physical and Social Environments	"
	9	Physical Exercise Changing Food Thoughts	"
6	10*	Review	"
7	11	Problem-Solving and Learning Self-Instructions	"
8	12	Problem-Solving	"
9	13	Problem-Solving	"
10		no meeting	
11	14	Problem-Solving	"
12	15	Maintenance	"
13	16*	Maintenance	"
14	18	Maintenance	"

*One family member attended these sessions with Group I participants.

The next study sought to examine some methods by which a supportive environment might be structured.* Thirty-six overweight adolescents (13 to 17 years of age, ranging from 15% to 50% above average weight for age, height, and sex) were assigned to one of four treatment groups. All subjects were required to deposit with us the equivalent of 15 weeks of their allowance or estimated earnings from part-time employment with us. A 2 × 2 design was used to test the relative efficacy of two reward contingencies (weight loss vs. habit change) and two levels of therapeutic contact (daily vs. weekly). Subjects in the weight-loss groups received deposit refunds for achieving weight-loss goals of one pound per week. Subjects in the habit change groups received deposit refunds for maintaining caloric intake below an established goal level. Subjects in the daily contact groups came to Stanford each morning or afternoon to receive refunds for meeting weight loss or habit change goals. Subjects in the weekly contact groups reported on a weekly

*This study was developed by Thomas J. Coates and Robert W. Jeffery in collaboration with Brian Danaher. Lee Ann Slinkard assumed major responsibility for the day-to-day operation of the program; she and Joel Killen conducted all treatment sessions.

basis only for refunds only, and received no treatment. Perfect adherence to goals would have permitted the participants to earn back all of their deposit.

All subjects met in groups with two paraprofessional leaders for ten one-hour sessions during which weight-loss lessons were presented via videotape supplemented with group discussion, reading materials, and modeling with guided practice. Participants were encouraged to analyze individual eating patterns and problems and then devise and try out possible solutions. Five additional group meetings were devoted solely to problem-solving and practice in weight loss skills. Results are presented in Table 6.

In the next study, 31 adolescents (mean percent above ideal weight = 30.6%, range = 7.2 to 72.5%) were assigned to one of two treatment groups: parental involvement, or no parental involvement. Participants were charged a $35.00 non-refundable fee for service, and were required to deposit $130.00 at the beginning of the program. All students were reinforced daily for weight losses of one pound per week. For the first 15 weeks of the program, they were refunded $1.00 each day that their weight was one pound below their weight of one week ago and their lowest previous weight. For the remaining 5 weeks of the program, they were given refunds of $5.00 per week for maintaining their weight at post-treatment levels. The remainder will be refunded for attending follow-up evaluations. All students attended weekly classes to learn weight loss skills and problem solving skills via videotape, role play, and group discussion.

Parents of students assigned to the parental involvement group were required to deposit an additional $95.00 with us. This was returned at the rate of $5.00 per week for 13 weeks for completion of behavioral homework assignments. These parents also met in separate group meetings to learn skills for helping their children lose weight. A roster of classes is presented in Table 7.

Changes in weight and in percent overweight are presented in Table 8. A one-way analysis of variance on changes in percent overweight was significant ($F = 11.71$, $df = 1/30$, $p < .001$).

Weight losses were less than expected. Based on the results of Study 1, it was hypothesized that weight losses in the treatment groups would equal those achieved by the daily contact-reinforcement for weight loss group in the previous study. One major change in procedure, however, could explain the differences in results obtained between the two studies. The contingencies were much more stringent in Study 2 than in Study 1. In Study 1, subjects were required only to be one pound below their weight of the previous week. In Study 2, subjects had to be one pound below their weight of the previous week, and their lowest previous weight. The more stringent requirement in Study 2 discouraged some subjects who experienced lapses or setbacks in weight loss efforts. If maintenance data from Study 2 are promising, future studies might focus on optimal contingency and parent involvement procedures to maximize initial and long-term weight loss.

Table 6
Percent Overweight and Pounds Overweight at Baseline, Post-treatment and Follow-up

Group		*Baseline*	*Post-Treatment (15 weeks)*	*6-month Follow-up*
Percent Above Ideal Weight				
Daily weight	$\bar{X}$	37.27	25.29*	29.26†
	S.D.	(22.33)	(17.48)	(27.70)
Weekly weight	$\bar{X}$	39.38	34.23	49.79
	S.D.	(25.57)	(23.67)	(30.47)
Daily habit	$\bar{X}$	37.32	31.13	34.89
	S.D.	(23.99)	(25.15)	(30.89)
Weekly habit	$\bar{X}$	46.12	41.12	51.88
	S.D.	(23.96)	(29.55)	(49.98)
Pounds Above Ideal Weight				
Daily weight	$\bar{X}$	49.21	32.64**	39.07††
	S.D.	(31.38)	(23.97)	(36.76)
Weekly weight	$\bar{X}$	51.33	44.25	60.42
	S.D.	(38.03)	(34.39)	(41.01)
Daily habit	$\bar{X}$	43.39	35.72	39.07
	S.D.	(26.38)	(27.41)	(34.28)
Weekly habit	$\bar{X}$	64.78	56.83	67.44
	S.D.	(35.04)	(45.97)	(57.27)

*significantly different from baseline, $t = 2.91$, $p < .02$
†significantly different from baseline, $t = 2.49$, $p < .04$
not significantly different from post-treatment, $t = 0.78$, n.s.
**significantly different from baseline, $t = 2.88$, $p < .02$
††significantly different from baseline, $t = 2.17$, $p < .04$
not significantly different from post-treatment, $t = 1.05$, n.s.

Table 7
Roster of classes for parents and adolescents

Week	*Students*	*Parents*
1.	Introduction—Calories and weight.	Introduction—Calories and weight.
2.	Reinforcing yourself and your parents for change.	Reinforcing yourself and your children for change.
3.	Exercise	Exercise
4.	What to eat—calories and heart health.	What to eat—calories and heart health.
5.	Problem-solving	Problem-solving
6.	Problem-solving	Problem-solving
7.	Problem-solving workshop—parents and students together	
8.	Fat and thin thoughts	Positive and negative thoughts about your children.
9.	Using imagery for problem-solving and self-control	Using imagery for problem-solving and self-control
10.	Pot luck barbecue	
11.	Problem-solving workshop—parents and students together	
12.	Exercise workshop	Reinforcing exercise
13.	Eating in restaurants	
14.	No class	
15.	Criteria for success and self-evaluation	Criteria for success
16.	No class	
17.	Individual interviews and problem-solving	
18.		
19.	Final class-Disco party and buffet	
20.	Final weigh-in	

Table 8
Changes in Percent Overweight and Weight
Study 2

	Pre	*Post*	Difference
Percent Overweight			
Parent Involvement	32.12 (16.13)	23.82 (14.20)	-8.30 (5.30)
No Parent Involvement	29.10 (13.64)	26.10 (13.32)	-3.00 (12.68)
Weight			
Parent Involvement	171.84 (21.82)	161.78 (19.03)	-10.06
No Parent Involvement	174.06 (33.28)	168.16 (19.79)	-5.90

These preliminary evaluations indicated that this combination of incentives and therapeutic contact was associated with statistically and clinically significant weight losses in adolescents. Although we appear to have achieved some success, the limitations in the present results are obvious. Although daily weigh-ins combined with refunds for weight loss produced the greatest average effect, the variability among subjects remains large. For example, why did some persons lose more than 30 pounds, while others in the same group lost nothing or even gained? Of course, the next 12, and 24 months will tell the story as we determine whether these losses are continued or even maintained.

OTHER DEPARTURES

The impression that considerable progress has been made, or at least that an important breakthrough is imminent, is often conveyed in chapters such as this one. We have consciously avoided that conclusion. The average short-term weight losses reported are among the best reported for overweight adolescents (cf. 11) and are superior to average effects achieved with overweight adults (cf. 57). Clearly, some advances have been made, but our current knowledge of the problem and how to design a successful treatment program is meager. We are better informed about ineffectual treatments than about effective long-term success.

Some speculation about where to go from here might be helpful. Peer models represent a powerful yet untapped resource for treating children and adolescents (cf. 29). Formerly obese adolescents might be effective in working

with professionals or older paraprofessionals in offering treatment on an individual as well as on a small group basis. It is quite possible that prestigious peers could also teach skills via classroom groups in school settings.

Further study is needed to determine more effective ways to mobilize and maintain family support in weight loss programs. Garn and Cole (19) have presented data which show that obesity tends to run in families, not because of genetic factors, but primarily because of environmental factors. Brownell et al. (7) obtained average weight losses of 20 pounds among adults when spouses participated actively in treatment weight-loss sessions and both persons contracted for behavior change. Perhaps a similar system could be adopted for use within an entire family. Based on our experience, however, it may be necessary to provide support systems to encourage family adherence to the program as well.

Laboratory and field studies of specific processes used by children and adolescents to regulate eating and exercise are needed. Some descriptive information has been collected. The overweight child and adolescent is not likely to eat more than leaner peers, but is more likely to have elevated blood pressure and higher levels of serum lipids and insulin; to be less physically active; to be socially discriminated against by peers and adults; to have a distorted body image; to have overweight parents; and to be a member of lower socioeconomic classes (11). But at present, we know almost nothing about specific factors that may mediate their obesity: The quantity and quality of food stored in their homes; the personal "meanings" of being overweight; their perception of calories and portion size; the frequency of specific problem-eating patterns and situations; their personal beliefs (attributions) about the causes (and cures) of obesity; their expectations of personal efficacy for regulating eating and exercise patterns; and their personal values associated with food and physical activity. Particularly noteworthy is the area of personal problem-solving. We need to examine ways of assessing, teaching, and encouraging the use of problem-solving skills in natural settings while the problems occur. Some preliminary evidence of a problem-solving oriented weight loss program with female obese subjects appears promising (6). Similar efforts are needed with children and youth focused on issues of eating and physical activities (cf. 43).

This type of inquiry deserves a very high priority. Without this kind of information, clinical intervention will continue to provide modest, inconsistent, and highly variable results. The variety of questions and problems involved deserves a variety of research designs, settings, and strategies. We need to be alert to the possibility of developing measurement methods that range across personal, behavioral, and environmental domains. At the same time, we need to conceptualize the problem of obesity and the regulation of eating and exercise in new, divergent, and perhaps more

complex ways. Revising and expanding theory as well as treatment procedures, without sacrificing the power of empirical parsimony, is the scientific challenge. Given our current record of success and failure, it may require that we excercise goodly amounts of creative disciplined behavior combined with ample supplies of patience and perseverance. A sense of humor may also help.

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The Comprehensive Handbook of Behavioral Medicine, Volume 2

CHAPTER 6
The Behavioral Treatment of Anorexia Nervosa

James Ferguson

Anorexia Nervosa is one of the first physical disorders for which a psychological etiology was attributed. In his initial case report of Nervous Phthisis in 1684, Richard Morton described an 18-year-old patient who "fell into a total suppression of her monthly courses *from a multitude of cares and passions of her mind.*" Following this, "Her appetite began to abate, and her digestion to be bad; her flesh also began to be flaccid and loose, and her looks pale, with other symptoms usual in the universal consumption" (tuberculosis). By the time she applied to him for treatment, she was very thin. "I do not remember that I did ever in all my practice see one that was conversant with the living so much wasted with the greatest degree of consumption, (like a skeleton only clad with skin) yet there was no fever, but on the contrary a coldness of the whole body." He describes her hyperactivity, vomiting, self-neglect, and the only temporary success of his prescriptions of various medications. Finally, "she beg'd that the whole affair might be committed again to nature, whereupon consuming every day more and more, she was after three months taken with a fainting fitt, and died" (39).

When the English physician Sir William Gull rediscovered and described this disorder in 1868, he gave it the descriptive name "anorexia nervosa," preserving its presumptive emotional etiology (27). His French contemporary, Lasègue, published a description of the same syndrome a few years later, calling it anorexia hysterique (36). Despite the astuteness of these early observations, anorexia nervosa remained a medical curiosity until recent times. Since 1960, a large number of articles and monographs have been published describing anorexia nervosa and its treatment. The reasons for this flood of publication are many: Increased sophistication in medical

diagnosis, which led to better differentiation of anorexia nervosa from other wasting disorders; advances in endocrinology concurrent with an interest in hypothalamic mechanisms that control bodily functions such as menstruation; better case finding; the advent of large population surveys for mental disorders; and the introduction of new psychotherapeutic techniques that make it a treatable disorder and no longer fatal in 7% to 21% of cases (11). Finally, anorexia nervosa may be becoming increasingly prevalent. Studies suggest that among adolescent schoolgirls between the ages of 16 and 18 as many as 1 in 100 meet the most stringent diagnostic criteria for anorexia nervosa (19). Other surveys place the incidence at between 1 in 150 and 1 in 250 in this susceptible population (21). Approximately 1 out of 20 patients with a diagnosis of anorexia nervosa is male (32). The age of onset is usually adolescence, although it can range from prepuberty to, in rare cases, the early 50's (35). Sisters of identified patients with anorexia nervosa have a 7% concordance for the disorder, and parents have a higher incidence of the disorder than chance (29); the mode of transmission between generations is not known. Patients with anorexia nervosa are usually well-behaved, perfectionistic, model children (12), and the onset in many cases appears to be related to a stressful life situation.

Individuals with this disorder demonstrate many behaviors apparently directed toward losing weight. These include a drastic reduction in total caloric intake, often achieved by not eating carbohydrate and fat-containing foods, self-induced vomiting, and extensive exercise programs. Laxatives or diuretics are often used in an attempt to lose weight. Despite their refusal to eat, these individuals often think of little else than food and meal preparation. They frequently collect recipes and cookbooks and are often very well informed about the nutritional and caloric content of foods. Often they have bizarre food handling, preparing, and eating behaviors which may make food unpalatable or conceal food disposal (25). The term *anorexia* is a misnomer, since loss of appetite is usually rare until late in the illness. Most patients' appetites are intact and held in check by their intense fear of losing control over their eating, gaining weight, and becoming obese (17, 15).

The *Diagnostic and Statistical Manual* (III) establishes the following criteria for diagnosis of this disorder: "A) Refusal to maintain body weight over a minimal normal weight for age and height; B) weight loss of at least 25% of original body weight or if under 18 years of age weight loss from original body weight plus projected weight gain expected on pediatric growth charts which may be combined to comprise 25%; C) disturbance of body image with inability to accurately perceive body size; D) intense fear of becoming obese; this fear does not diminish as weight loss progresses; E) no known medical illness that would account for the loss; F) amenorrhea (in females) that often appears before notable weight loss."

A wide range of medical and psychological treatments has been proposed for anorexia nervosa. These include classical psychotherapy stressing psychodynamic insight (34, 48); psychotherapy emphasizing awareness of feelings, thoughts, and impulses that originate with the patient (15); superficial educative psychotherapy (26); communication theory and psychodynamically oriented family therapy (46); structural family therapy (43); systematic densensitization to a weight phobia (28); positive reinforcement for food intake or weight gain (4, 5); formula feeding and termination of isolation for weight gain (31); and systematic behavior modification programs (2, 8, 41). Medical treatments for the disorder have included tube feeding (44), treatment with a variety of neuroleptic medications (20), subcoma levels of insulin (24), ECT (7), tricyclic antidepressants (38, 40), intravenous glycerol (16), cyproheptadine (49), L-Dopa (33), lithium (6), Pimozide (42), and the surgical procedure of leucotomy for intractable cases (18, 47). Most of these treatments are described in case reports with small series of patients.

In the behavioral literature, the initial report of successful treatment was by Bachrach (5), who modified the eating behavior of a severely emaciated girl by initially reinforcing the act of eating, then the amount eaten, and finally weight gain by the use of contingent social attention and access to a wider array of pleasurable events contingent upon daily weight gain. Blinder et al. (10) reported treatments for anorexia nervosa involving the use of two high-probability patient behaviors—hyperactivity and access to activity—as reinforcers for weight gain, and the negative reinforcement of lowering a daily dose of chlorpromazine contingent upon weight gain. In each of these studies, there were rapid gains in weight with minimal resistance by the patients. These apparently successful outcomes were in marked contrast to the psychiatric treatments for anorexia nervosa prior to that time.

When they analyzed their data, Leitenberg and his colleagues (37) made an interesting discovery about their behavior modification program. Although their treatment was effective, in one sense it was too effective. When access to ward privileges was contingent upon weight gain, caloric intake and weight increased from baseline levels. However, when reinforcement for weight gain was discontinued, caloric intake was maintained and weight gain continued. They reasoned that the behaviors associated with food intake and weight gain should decrease in frequency if they were under the control of their reinforcers. The failures of their reversal procedures caused them to wonder about the possibility that other variables were operative in the behavioral treatment of anorexia nervosa. They designed a series of single case studies to tease out these variables (1). After replicating their earlier finding that positive reinforcement was effective in producing weight gain in these patients, they tested the hypothesis that negative reinforcement is also a

motivational factor. Patients contracted to stay in the hospital for a fixed length of time (12 weeks) regardless of weight gain or loss. In this way, the negative reinforcement of leaving the hospital was removed. Under this set of circumstances, when reinforcement in the form of ward privileges was made noncontingent on weight gain, caloric intake decreased and the rate of weight gain declined. The reintroduction of contingent privileges led to a resumption of weight gain.

Despite this demonstration of the therapeutic effects of positive and negative reinforcement, the authors felt that further therapeutic variables were active in the treatment program. Generalizing from behavioral research that demonstrated the role of information feedback in skill acquisition and control over autonomic function and the role of information about therapeutic progress in the modification of phobic behavior, they postulated that information feedback was an important variable in the treatment of anorexia nervosa. In an experimental setting, they varied information feedback by providing the patient with a daily weight measurement, a dietitian's estimate of the number of calories consumed per eating episode, and a self-monitored count of the number of mouthfuls consumed in each meal. They found that reinforcement for weight gain was ineffective without feedback about progress and concluded that feedback of information about caloric intake set the stage for reinforcement to be effective in increasing eating behavior. As a final part of their treatment program they replicated the work of Elkin (22), who in earlier experiments had found that meal size was an additional variable in the treatment of anorexia nervosa, i. e., that these patients tend to eat more calories when a larger portion is served to them than when a smaller portion of the same food is served to them.

Halmi (25, 31) has utilized the aspects of positive and negative reinforcement and information feedback. In addition, she changes the patient's food intake to a liquid formula which is gradually increased from 125% of basal requirement to 200% basal requirement by the third week in the hospital. In her program, patients begin with no visitors, no phone calls, and no mail. They have access to a radio but not to television, and only the hospital staff are allowed in their rooms. They are reinforced by access to mail, phones, and vistors if they gain weight over a period of five days. If they do not gain weight over this period of time, they receive no privileges, and if they lose weight they are tube fed until they attain the weight they had at the beginning of the five-day period.

The therapeutic elements demonstrated by Agras et al. (1) were combined into a treatment program on the inpatient general psychiatric unit at Stanford University (2). Prior to entry into the hospital, each patient was evaluated in one to three outpatient interviews. In these sessions the principles of treatment were explained to the patient in detail and the voluntary nature of the program emphasized. Often when patients were reluctant to enter the

hospital, a limited number of outpatient treatment sessions was conducted with strictly defined weekly weight goals. Once the physician and the patients were in agreement that hospitalization was in order, the patients were admitted to the psychiatric ward where they received a physical examination and indicated metabolic studies. During the first few days in the hospital, they were asked to count the number of bites of food they ate and sips of caloric liquids with a small hand counter and to keep a graph of the number of bites they consumed for breakfast, lunch, dinner, and snacks. The simplifying assumption was explained to them, that if they kept the size of their bites constant and the meal content constant, the average caloric content of each bite would be the same. The cumulative number of bites they have consumed gives them a very accurate estimate of caloric intake at any time. Patients were allowed to choose any diet available at the hospital, and to supplement the hospital fare with food from outside sources. However, they received 5000 calories of their selected food divided into four meals a day. If their food choice was markedly unbalanced, a dietitian provided additional food beyond that requested to make a well-rounded diet. Patients were asked to sit by their food for 45 minutes alone in their room whether or not they ate. No attempt was made to observe their eating or to quantify the amount of food eaten. It was explained to the patient that the sole dependent variable we were interested in monitoring was body weight, which was determined each morning post voiding. The other variable, bites per day, was her tool for gaining control over her eating. A graph of the number of bites per day and weight was posted on the wall in the patient's room.

After three or four days on the psychiatric ward, a contingency contract was negotiated with the patient which stipulated positive reinforcement for weight gain and penalties for weight loss. A copy of this contract (Table 1) was given to the patient, the nurses, the therapists, and included in the medical chart. Positive reinforcement in this program was usually free access to the hospital ward and the hospital grounds. These privileges extended from 7 A.M. until noon for 0.1kg weight gain, and were unlimited if the patient gained 0.2 kg or more in one day. If the patient failed to gain weight, or lost weight, she was asked to stay in her room alone until she gained her previous high weight. The patient negotiated a discharge weight in the contingency contract which approximated standard height and weight chart norms for the lowest quartile weight. This provided a criterion for discharge and release from the negative reinforcement of being in a hospital. Bonus reinforcers were negotiated for set weight criteria; for example, one patient asked for extra physical therapy when she reached 35 kg, another wanted trips home on weekends after she reached 40 kg, and one woman wanted tennis lessons as a reward for reaching a weight of 45 kg. Although cheating was not monitored, patients were told that drinking water or hiding heavy objects on their body to increase the scale reading would catch up with them within a few days when

they reached the maximum concealable weight. Similarly, vomiting was not monitored, but had to be compensated for by eating more food if they were to enjoy the positive reinforcements.

The behavioral program is carried out in a therapeutic milieu or therapeutic community which sets limits for the patients' behavior and at the same time provides support and opportunities for learning social skills and appropriate interpersonal behaviors by modeling on others and directly by instruction from the staff. In this setting, the patient can discuss a variety of fears—from food phobias to the fear of going out of control, eating everything in sight, and getting fat—without incurring rejection or excess parental concern. Frequent videotape sessions help the patient become aware of her body size and shape and compare herself to others. In addition to the behavioral program, various forms of therapy were used to work on interpersonal and intrapsychic problems present in virtually all of the patients despite histories of successful school and job performance. Early in the hospitalization, family or couples therapy was begun to deal with the struggles and miscommunications between the patients and their families. Specific behavioral treatments such as assertiveness training, and relaxation, were used as necessary along with ongoing psychotherapy, which focused on issues of loss of control, self-esteem, and the pervasive sense of lack of autonomy and social ineffectiveness from which these patients seem to suffer.

Eating continues to be a struggle much of the time the patients are in the hospital. However, with the incorporation of feedback information, the patients gain a sense of control over eating. By the time of discharge, most of the patients experience a feeling of personal effectiveness often not felt for many years.

The first 25 patients admitted to the Stanford Program were female with an average age of 26 years (15 to 46 years). Three patients left after a short time in the program without gaining weight. Including these treatment failures, the average length of stay was 54 days (12 to 113 days) with an average weight gain of 7.3 kg (0.15 kg per day), or 20% of their pretreatment weight (2). Figure 1 shows the typical pattern of initial weight loss of patients admitted to the hospital followed by a very regular weight gain once contingencies for weight gain are established.

During their treatment none of the patients felt coerced to eat. The struggle to eat or not to eat was experienced as an internal problem rather than an authority struggle with external agents. In this series, patients were not routinely medicated, although on occasion diazepam would be prescribed for anxiety or to sleep. Patients were not threatened with civil proceedings, nasogastric feedings, or large doses of psychotropic medication. The motivating properties of social isolation imposed on a voluntary basis and expressed through a contractual agreement in writing appear to be sufficient to treat this population, many of whom have been ill for many years. The

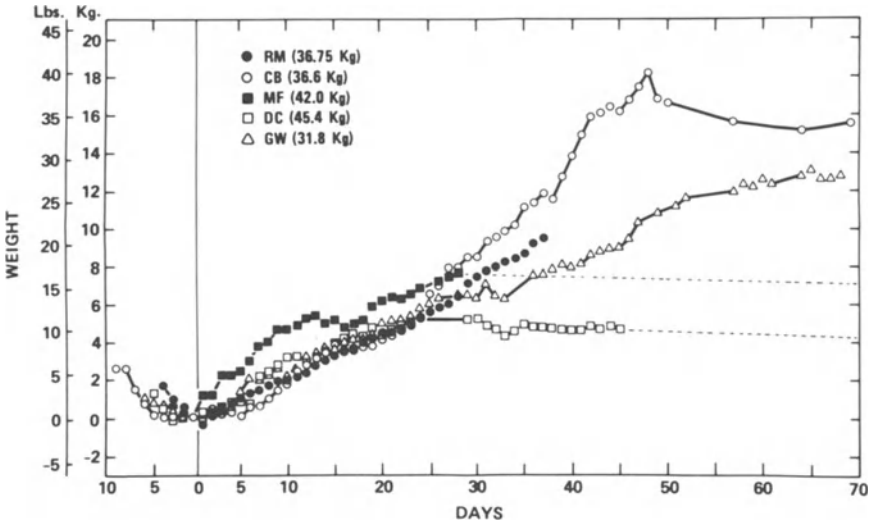

Fig. 1. Weight gain of five consecutive female admissions to an inpatient behavior modification treatment program for anorexia nervosa. Almost all patients initially lose weight on admission, but begin to gain at a very predictable rate once contingencies are imposed.

long-term effects of this treatment are not known, and follow-up studies are in progress to review weight maintenance, social adjustment, and other measures of therapeutic effectiveness several years after treatment.

Although the behavioral treatment of anorexia nervosa appears to be quite rapid, it still requires a considerable length of time in an inpatient hospital setting. To date there has been no systematic investigation of the application of these principles in an outpatient setting. Despite the theoretical advantage of modifying eating behaviors and environmental reinforcement patterns in their natural setting, in a clinic setting one rarely has an accurate estimate of patient food intake, weighing cannot be standardized as on a hospital ward, it is difficult to change environmental reinforcers for appropriate and inappropriate eating behaviors, the home environment is often very difficult to modify even with heroic efforts at family therapy, and one loses some of the effectiveness of therapist reinforcement because the behaviors being reinforced are usually temporally remote from the visit to his office. On occasion it is possible, however, to apply behavioral treatment principles in an outpatient setting for a patient with anorexia nervosa. The following clinical example demonstrates this type of therapeutic approach.

C. B. is a 16-year-old white girl referred for treatment from the department of endocrinology after a complete workup showed no organic basis for weight loss as well as the diagnostic features of anorexia nervosa. She is the product

of a normal pregnancy and delivery, and the second of three children in an intact family. She was never a problem child at home or in school and always did well academically. Her pediatrician noticed she was very slender when she was seen for a routine physical exam at age 13 10/12. By the time of her next checkup at age 15 10/12, she had lost six pounds, despite a small increase in height.

When first seen, the patient did not acknowledge that she was underweight or that she needed any form of psychiatric help. She refused to cooperate beyond occasional yes or no responses to direct questions during therapy. During the first two months of therapy, individual and family therapy sessions alternated. Much of this time was spent attempting to form an alliance with the patient, who did not want to be treated, and with her family, who had an intellectual commitment to treatment but a reluctance to change family reinforcement patterns. After nine visits to her therapist over an eleven-week period of time, the following contingencies were negotiated: 1) The patient would be weighed each morning by her parents in the same state of dress, and this weight would be recorded on a weight graph. 2) Access to the activity which appeared to be always pleasurable to her, fixing food for her family and herself, would be restricted to days when she gained weight. If she lost weight or stayed the same, she would have to eat what her mother fixed for her or go hungry. 3) She would have to continue to come to therapy sessions until she had reached a "safe" weight of over 100 pounds. Once this weight had been reached, a new agreement could be negotiated as to the length of time she would have to be in treatment.

Her initial response to this contract was skeptical, and her parents felt it was manipulative. However, after an explanation of reinforcement principles they doubtfully agreed to implement the treatment program. During the initial week she lost weight and on investigation it was found that despite weight loss, she was still allowed to cook for her pets at home. (She claimed that we had only specified cooking for humans in our agreement.) All cooking was made weight contingent and she soon reversed her pattern of intake. Although she denied an increase in food intake for two months, she continually gained weight. During the course of treatment, it was agreed that the contingencies at home would be discontinued once the goal of 95 pounds had been reached, and that once the goal of 100 pounds had been reached, the therapy sessions would become less frequent. If she maintained her weight gain, these sessions would be made progressively further apart until they were no longer necessary. In an interview on April 25, she was asked what therapeutic intervention had resulted in her weight gain. She was unable to verbalize any specific strategy, and she denied that the contingencies were the effective element in treatment. However, she said that at some point it felt as though control over her eating and several other areas of her life passed from

her parents to herself. She felt this change occurred about one week after the contingencies were imposed. Her weight gain is illustrated in Figure 2.

This case history illustrates the outpatient application of many of the principles discovered by Agras et al. in an inpatient setting using single case design subjects (1). Although much of the time in therapy was spent preparing the patient and her parents to accept a contingency contract, once the contract was established it appeared to be effective. The positive reinforcement of cooking for herself and her family, the negative reinforcement of less frequent therapy sessions, and daily weight feedback with social reinforcement for weight gain all helped her in her treatment.

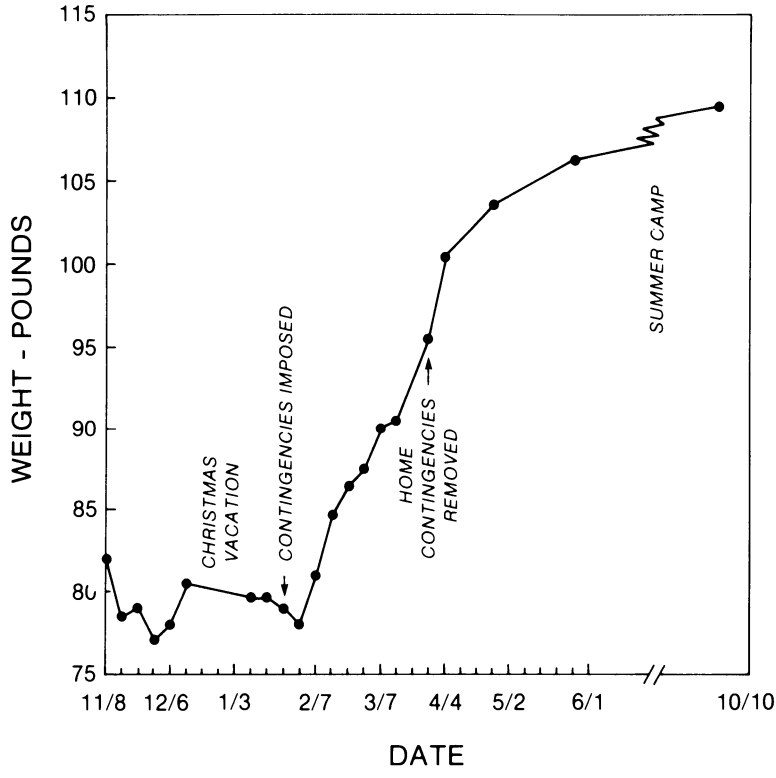

Fig. 2. Weight graph for patient C. B. Subsequent to commencing therapy, her weight remained roughly stable. Immediately after contingencies were imposed, she lost weight, but when the contingencies were enforced she began to gain weight at a regular rate. As she approached her desired weight, contingencies at home which positively reinforced weight gain were removed, and the negative contingencies, continuing in therapy, were thinned.

Although there is much anecdotal and single case material in the literature, and many descriptions of comprehensive behavioral treatment programs, outcome studies describing long-term follow-up subsequent to behavioral treatment for anorexia nervosa are virtually lacking. Previous long-term studies of "new treatments" for this disorder have been somewhat disheartening at the time of follow-up. For example, Dally and Sargent (20) found that at three-year follow-up, their patients treated with chlorpromazine and bed rest did not differ significantly in weight from patients who had received nonspecific hospital care: Approximately one-third of both groups were markedly underweight three years later. Similarly, Browning and Miller (12) could find no correlation between weight gain in the hospital and weight maintained at follow-up in a series of 36 patients treated with a variety of techniques.

The immediate success of these techniques has often been demonstrated. However, not only must the patient with anorexia nervosa be returned to an appropriate weight, this weight must be maintained over an extended period of time, and it must be accompanied by a return to adequate daily functioning. Bhanji and Thompson (9) reviewed their treatment of eleven anorexics, ten of whom gained weight during hospital treatment. A postal questionnaire study three years after discharge indicated that only three of seven patients responding were at normal weight. Halmi (30) followed her patients at seven-month posttreatment and found that seven of eight contacted were functioning well at the time of follow-up. More recently, Pertschuk (41) followed 29 patients treated by behavioral techniques at the University of Pennsylvania Inpatient Service. The follow-up interview was from three to 45 months (average 23 months) postdischarge. They could not locate two of the patients. Discharged patients averaged 24% below standard weight at the time of discharage, which improved to 12% below standard weight at the time of follow-up. Eighteen of the 27 patients contacted were within 20% of normal weight at the time of follow-up. However, the authors felt that only two of the 27 had completely recovered from the disorder and had no accessory symptoms at two-year follow-up. Twelve patients had required rehospitalization, six for weight loss, four after suicide attempts, and two for depression. Of these, ten were readmitted within six months after discharge. Normalization of eating patterns did not parallel normalization of weight. Most patients at follow-up continued to express an excessive concern with food, calories, and weight. Ten patients shifted from a pattern of food restriction to bulemia, a disorder that had not been present in these ten patients on admission. In most cases this was accompanied by compulsive vomiting. No patient who had acknowledged vomiting as a problem on admission was found to have controlled it at follow-up. Most significantly, improvement in the hospital was found *not* to correlated with long-term weight maintenance ($R = -0.10$, $p = 0.23$). The psychotherapy or lack of

psychotherapy received in the two years between hospitalization and follow-up is extremely important for the interpretation of their data. All of the patients apparently received subsequent outpatient therapy, which varied considerably since patients were referred back to local treatment resources. The authors point out that discontinuity in treatment may have accounted for some of the discontinuity in progress.

There has been no systematic attempt to compare behavior therapy with other therapeutic modalities. Although single case designs point out the effectiveness of therapeutic interventions, they often cannot answer the question, "Is therapy A more effective than therapy B?" Only comparative studies with matched populations can adequately address this problem and avoid the interpretation problem of differential referral. Ideally, a clinical research center would randomize treatment with every other girl receiving behavioral treatment or an alternative psychotherapeutic approach. To date, this has not been done by design. However, Garfinkle et al. (23) report the outcome of 42 patients treated with a variety of methods. They compare 17 patients treated primarily with operant conditioning techniques, with 25 patients treated with other types of somatic and traditional psychotherapy. In their analysis, they point out several population differences, the behaviorally treated patients were younger (17 vs. 22 years old) with an earlier age of onset (15.6 vs. 18.1 years) and a lower initial weight (34.1 vs. 40.2 kg). However, when the data was subjected to an analysis of covariance, these factors did not appear to be significant, and there do not appear to be any significant differences in outcome between the different treatment modalities.

Russell (45) continues to feel that the most effective therapy for anorexia nervosa is admission to a hospital where basic care and good nursing are available. He feels in this situation weight usually is put on rapidly, but points out that weight return is necessary but not sufficient for cure. When he followed up 41 patients treated with his nursing program, he found results somewhat better than those reported by Pertschuk. Thirty-nine percent of the girls maintained a normal body weight, and "only a few of the patients expressed psychological symptoms, and when present they consisted mainly of mild anxiety or depression." Twenty-seven percent of the patients experienced "minor difficulties in maintaining steady weight including two obese patients, the psychological, sexual, and socioeconomic adjustment also tended to be less satisfactory." Twenty-nine percent of the patients remained markedly underweight (mean weight 68% of ideal average body weight).

In reviewing the types of studies, it is clear that Russell's program can be defined in terms of behavioral techniques,, or the behavioral programs can be defined in terms of good nursing. As mentioned earlier, a controlled randomized outcome study would be the only way to answer the question, "How does behavioral treatment for anorexia nervosa compare with other treatments?" In addition, it is obviously necessary to specify exactly what

happens in the interim between discharge and follow-up. The problem of differential referral from community physicians with "difficult" cases going to one center and "easy" cases going to another, along with the difficulty in specifying the treatments received from a ward staff by a patient in any program makes comparison of results between treatment centers suspect.

The term *behavior therapy* has been used to describe treatments that range from involuntary commitment with a series of rewards and punishments for weight change to simple relaxation techniques. A careful description of the actual procedures used and the context in which these therapies are administered is necessary if we are to make valid generalizations about therapeutic efficacy. Many of the interventions proposed in the literature can be imposed arbitrarily and in an authoritarian manner and may in fact be detrimental, the patients already being impaired by a paralyzing sense of ineffectiveness. Hilde Bruch cites several behavioral therapy casualties (14) among treated patients. She tells of one patient who became schizophrenic and another who committed suicide after weight gain was induced through behavioral manipulation. These perils of behavior modification may be more apparent than real. In these two cases, it appears that no attempt was made to modify the social environment to which the "newly normal size" patient was returned, a vital part of any treatment program.

In assessing the various approaches to the treatment of anorexia nervosa, it must be remembered that all traditional and behavioral treatment programs are a mixture of treatments conducted in a therapeutic milieu, whether defined as such or not. In an inpatient setting, or in an outpatient setting such as the anecdotal report in this article, there are clearly many interpersonal factors operating in the treatment program that have yet be specified.

TABLE 1
Basic Contract For Anorexia Nervosa Patients

GOAL: To gain at least 0.1 kg (0.22 lbs) a day and to establish a trend that will result in a weight gain of a minimum of 0.7 kg (1.54 lbs) in a week.

PLAN: While in the treatment program, patients will eat their meals alone in their room unless otherwise specified by their physician. They will be served four meals a day: breakfast, lunch, dinner, and an evening snack.

Each Meal will last at least 40 minutes, during which time the patient must sit next to the food whether or not she eats it. Patients have free choice of food from the hospital menu and can exchange their food for similar items on the ward food cart. They can have snacks at any time *in addition* to regular meals. These can be ordered in advance from the hospital kitchen or bought outside the hospital. In all cases, the staff will determine the quantity to be served at each meal and make additions if necessary to insure that the patient is served 5000 calories of food each day.

We will use restriction of social contact and activities as a motivating factor in changing eating behaviors. Free access to the therapeutic community will be made contingent solely on weight gain. During periods of restriction from the community, patients will be alone in their rooms. The extent of access to activities *within* their rooms will be determined by the following rules:

1. On the first three days of restriction, the patient will remain in her room with the door closed.
2. On the fourth successive day of restriction, and until the restriction is terminated, all books and reading materials, games, art and craft projects, musical instruments, radio, tape recorder and phongraph will be removed from the room. In this case, the patients will be served their meals in their rooms four times a day until the restrictions are lifted.

WEIGHT CONTINGENCIES:

1. If the patient's weight increases by 0.1 kg (0.22 lbs) in one day, she is allowed unrestricted activity from waking until noon. After noon, she must stay in her room without social contact.
2. If the patient's weight increases by 0.4 kg (0.44 lbs) in one day, she is allowed unrestricted activity, phone calls, and visitors.
3. If the patient's weight stays constant or decreases, she will only attend required ward meetings and Tuesday night family meetings. At other times, she will be restricted to her room. Emergency community meetings are considered required meetings. Wednesday afternoon outings are not allowed when the patient is on restriction.
4. During periods of restriction, to decrease social contacts, the patient must be alone in her room and not receive visitors or phone calls except in emergencies. A sign will be placed on her closed door asking the therapeutic community to respect her restriction. The patient is allowed three 5-minute trips per nursing shift to go to the kitchen, linen closet, or shower. These are in addition to a 5-minute period of food preparation at each meal time. If extra trips are made out of her room, or the staff feels that the time out of restriction is being abused, the privilege of leaving the room three times each shift while on restriction will be cancelled.
5. When a patient loses weight, the positive contingencies do not take effect until she regains her previous maximum weight. She must exceed her previous maximum by 0.1 kg for partial privileges or 0.2 kg for no restriction. Any exceptions to this rule must be written on the order sheet in the patient's chart by her physician.
6. Additional privileges can be obtained only on written order from the patient's physician. This includes physical therapy, swimming, passes during the day or weekends and special activities. The dietitian will see patients only when their physician orders a consultation.

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The Comprehensive Handbook of Behavioral Medicine, Volume 2

CHAPTER 7
Encopresis

Daniel M. Doleys

DEFINITION AND CLASSIFICATION

"Functional encopresis" refers to the passage of fecal material into the clothing or any generally unacceptable area in the absence of organic pathology beyond the age of three. This condition has also been referred to as "fecal incontinence" or "psychogenic megacolon." In a review of the literature, Fitts and Mann (16) uncovered a variety of defining qualifiers, including age, pattern of soiling, and etiology. Some writers have been strict in their age limit, extending it only to two years (6), while others have been more lenient, accepting four years as the lower limit (34). Many types of encopresis are not functional in nature, and they result from dietary factors, allergic reaction to food or other substances, infections, disease, or abnormalities in the anatomy or physiology of the large intestine.

There have been a variety of classification schema for encopresis, none of which appears to have achieved any prominence. Anthony (1) referred to the continuous, discontinuous, and retentive encopretic. The continuous (primary) encopretic is a child who has never displayed appropriate bowel control or functioning. The discontinuous (secondary or acquired) encopretic is a child who has at some time displayed appropriate bowel control and subsequently regressed to soiling. The retentive encopretic is identified by the presence of constipation resulting in subsequent soiling. Gavanski (21) classified encopretics on the basis of their being retentive, nonretentive, or having diverse and mixed symptoms. Excessive retention was attributed to a "pot refusal syndrome" related to inappropriate early training and/or fear of

the commode. Woodmansey (38) distinguished between groups of infantile and reactive incontinence, and Easson (12) combined many of the above systems, describing what was referred to as: 1) primary infantile encopresis, 2) primary reactive encopresis, 3) secondary infantile encopresis, and 4) secondary reactive encopresis.

Overflow incontinence refers to the leakage of fecal material around impactions created by fecal retention or constipation. Berg and Jones (6) in their classification of encopretics divided them into five categories: 1) training problems with constipation, 2) pot refusal-retention, 3) severe constipation with overflow incontinence, 4) uncomplicated functional fecal incontinence with a stressed subgroup, and 5) a distraction-precipitant subgroup. The stress subgroup referred to fecal incontinence that could be related to emotional trauma and disturbance, while the distraction-precipitant subgroup encompassed those children who soiled as a function of being distracted in play or who indicated they could not reach the toilet in time.

Walker (37) suggested three major categories in the classification of encopresis. One was referred to as manipulative soiling. Children in this category were found to soil consciously or unconsciously in an attempt to manipulate their environment, for example avoiding school, expressing hostility toward the parents, etc. He suggested that although this is thought to be a common cause of soiling, there is little data to support this idea. The second category included those children who soil in a diarrheaic fashion. These children appear to respond to emotional trauma and stress with incontinence. The third category includes those children who develop chronic constipation which results in impaction or psychogenic megacolon. Estimates by Levine (26) and Fitzgerald (17) suggest that 80% to 90% of identified functional encopretics would fall into this category and have overflow incontinence. Chronic constipation which results in impaction tends to be self-perpetuating. Excessive retention can lead to difficult or painful bowel movement (dyschezia), thus establishing a condition avoidance response to further elimination and encouraging more prolonged retention.

INCIDENCE AND ETIOLOGIC FACTORS

Levine (26) and Yates (43) have suggested that the incidence of functional childhood encopresis is approximately 3%. This figure is somewhat biased since it was obtained from a sample of children attending a psychiatric or general pediatric clinic. Other estimates range from 1.5% to 5.7% of the population. Although there is no consensus about the actual frequency of functional childhood encopresis, it is agreed that there is a large number of unreported or uncovered cases.

In a descriptive analysis of 102 encopretics, Levine (26) noted that 87 cases were between the ages of 4 and 13 years. Eighty-five percent of these were male, and more than half of the children were incontinent during the day as well as the night. The absence of the sensation signaling a need to defecate, abdominal pain, poor appetite, and lethargy were commonly noted. About 31% were enuretic, over 75% were found to have stool impactions, and nearly 40% were described as "continuous enuretics." Less than 30% of the cases had the personality traits usually ascribed to the encopretic, such as compulsive neatness, withdrawal, and hoarding.

In a recent review of the literature, Hersov (23) found that the occupational class of the parent did not appear to be correlated with the incidence of encopresis. Similarly, while there was some indication that encopresis was related to constitutional factors, such as a predisposition to constipation and formed stools, and to psychogenic factors, there was a remarkable absence of corroborating studies. The mother-child relationship has perhaps been the most referred to and the most systematically examined of possible etiological factors in encopresis. Several studies have considered the quality of the mother-child interaction, the coerciveness of training, and the ambivalence of parents as possible factors leading to the development of encopresis (1, 32). However, family pathology has not been found to be a significant factor, although some studies have noted a higher incidence of encopresis when familial and marital problems exist (39).

PHYSIOLOGY

A basic understanding of the mechanism of defecation is helpful in both the assessment and the treatment of encopresis. According to Anthony (2), defecation is in part a reflex produced by stimulation of receptors found in the rectal mucosa. Distension of the rectum is the usual stimulus for the response of defecation. This distension is brought about by mass peristalsis of fecal material out of the colon into the usually empty rectum. The filling and distension of the rectum results in a desire to defecate, increased colonic peristalsis, and a reflexive relaxation of the internal sphincter of the anus. Voluntary forcing efforts brought about through contraction of thoracic and abdominal muscles and the relaxation of the external anal sphincter following the initial desire to defecate bring about the final passage of fecal material. Parts of the act of defecation are clearly under voluntary control. When defecation is voluntarily inhibited by maintenance of pressure on external anal sphincters in the absence of voluntary contractions of thoracic and abdominal muscles, rectal receptors soon become depressed and adapt to existing pressure, which results in the suppression of the urge to defecate. This

urge may not return until 24 hours later when mass peristalsis again begins. During this 24-hour period water may be absorbed from the fecal mass in the rectal area, thus producing a very hard stool. A more detailed description can be found in Gaston (20).

ASSESSMENT

Successful treatment of the encopretic begins with a thorough and systematic evaluation. It is important to differentiate among the various types of encopresis for the purpose of differential treatment. For example, Anthony (1) noted that continuous encopretics benefit most from a continuation of basic toilet training since the bowel continence had not been achieved. On the other hand, he felt psychotherapy was most desirable for the discontinuous encopretic, assuming that the regression was the result of a psychological trauma. A similar stand has been taken by Walker (37), who suggests differential treatment for children who fall into the categories of manipulative soilers, diarrhea due to tension or anxiety, or a third category with retention.

Differential treatment is perhaps most notably advised in the case of excessive bowel retention and constipation. This condition, contrary to popular opinion, is observed very frequently in encopretics, and children who engage in excessive retention may display overflow incontinence that mimics diarrhea (7). Constipation and distension of the colon and passing stools into the pants may be indicative of *both* psychogenic and neurogenic megacolon. A differential diagnosis and thorough medical examination are unquestionably necessary in these cases.

Evaluation of the encopretic should consist of at least three phases. First, a precise measurement and description of soiling behavior during a three-week baseline in which the frequency of soiling, the magnitude of each incident, when or where the episode occurred, and appropriate toileting behavior are recorded provides a description of the child's behavior and also serves as an assessment of both parental motivation for treatment and the child's compliance. This procedure also provides a baseline against which treatment effects can be compared. Finally, it allows the therapist to discriminate between continuous and discontinuous encopresis.

The role of "fear" should be examined during the baseline period. Several researchers (3, 10, 22) have reported toilet phobias in encopretics. A "pot refusal" syndrome described by Gavanski (21) could possibly be caused by aversive procedures employed during toilet training. The pain which occurs during bowel movements following prolonged periods of constipation or voluntary retention may lead to additional fear of defecation.

A second aspect of assessment is a complete medical evaluation. It is important to discriminate between functional encopresis and encopresis that results from organic pathology. The detection of impactions may indicate excessive retention or bowel distension, and they could result in the loss of the sensation to void in response to the normal accumulation of feces. Purgatives, suppositories, or enemas may be needed in individual cases to assure daily cleansing and aid in the recovery of normal sphincter tone. These treatments require the recommendation and assistance of medical personnel. In some instances the symptomatology associated with functional encopresis is very similar to that of Hirschsprung's disease, a condition characterized by the absence of ganglion cells in part of the intestine (35). Ravitch has labeled these cases as pseudo-Hirschsprung's. Since different treatments are indicated for these two disorders, an accurate medical diagnosis, often with a biopsy, is mandatory. Information about previous medical, psychological, and parental treatment should be obtained during this evaluation. Much can be learned from treatments which have previously failed in an encopretic child.

Parental counseling and an examination of family interactions are also part of the assessment. Often, due to their own frustrations, parents unintentionally apply pressure to the child. This pressure, rather than helping, may hinder the therapeutic process and result in a worsening of the encopresis. Guilt over the use of what may be interpreted as harsh toileting procedures is not uncommon. Marital problems resulting from one parent tending to be overly harsh and the other overly sympathetic to the child may create additional difficulties in establishing a therapeutic environment. It is important that the parents discontinue all attempts at dealing with the encopresis and simply comply with the instructions from the therapist during the baseline period. Although infrequent, it is not unusual for some children, particularly of the discontinuous type, to begin exhibiting more appropriate toileting behaviors once the pressure and threats have been removed. Self-recording and self-monitoring alone have been successful in reducing or eliminating soiling in a number of children.

TREATMENT

Medical

Standard medical treatments for encopresis have typically relied on laxatives and enemas (30, 35, 36), with a reported relatively high rate of remission. Berg and Jones (6), in a review of this literature, have noted that the relief of soiling achieved by these "mechanical" methods tends to be

temporary. One of the more successful procedures was implemented by Davidson et al. (8), who employed a three-part program with 119 encopretics. The first part of the program used mineral oil in an attempt to produce regular bowel movements. After regularity had been established, the second phase of the program attempted to achieve and maintain bowel movements without laxatives by gradually withdrawing them. The third phase was a follow-up period with continued parental counseling and monitoring of the child's behavior by periodic contact and follow-up visits. Of 90 patients who completed this program (75% of the total sample), 80 were successfully treated (67% of the total sample; 89% of those completing treatment). Although laxatives and enemas were employed extensively in this treatment, it appears that a good deal of counseling, feedback, monitoring, physician time, support, and encouragement were also provided for the patient and his family.

Verbal Psychotherapy

Some studies (21, 28, 32) have used verbal psychotherapy and play therapy to treat encopresis. Rates of remission vary among studies. A review by Berg and Jones (6) of 70 children treated for encopresis noted that the rates of remission with psychotherapy were not significantly different from the spontaneous recovery rate without psychotherapy. Similarly, Ashkenazi (3) described three children who had not responded to psychotherapy or play therapy, but who later became continent when treated in a behaviorally oriented program that emphasized regular potting, induced defecation, and positive reinforcement. Although it is difficult to deny totally the possible effect of verbal psychotherapy and play therapy, it is also impossible categorically to accept these therapeutic methodologies in the absence of comparative studies and detailed descriptions of the therapeutic procedures.

Behavior-Conditioning Therapy

The use of behavioral or conditioning treatment procedures for functional encopresis emphasizes the arrangement of environmental consequences to encourage the development and maintenance of appropriate toileting behavior. There are several features to this approach that make it somewhat more individualized but at the same time more intricate and complex than other procedures. For example, identifying behavioral deficits that may be contributing to functional encopresis is an important aspect of these programs. Appropriate defecation in the commode is the final act of a long chain of behaviors. Many children may not have the behavioral repertoire necessary to produce this sequence of actions; for example, some children

may not know how to undress themselves quickly and successfully. These are important behaviors for toileting, and their absence is most conspicuous among those who are mentally retarded or neurologically impaired.

The application of behavioral principles and procedures is based upon the identification of a goal or target behavior. These behaviors are individualized and many vary from child to child. For example, for the continuous encopretic, the target behavior may be the development of appropriate toileting skills which include learning how to disrobe and using appropriate muscle tension to promote defecation. These behaviors may not be appropriate for a child who displays excessive retention and constipation. In these cases the goal is to increase regular and consistent bowel movements. This can be accomplished by using laxatives or enemas in conjunction with other procedures. Neither of these procedures may be appropriate for the child who has a pot-refusal syndrome of toilet phobia, and an entirely different set of target behaviors must be developed.

Doleys (9) has summarized many of the behavioral procedures that have been applied to the functionally encopretic child. He has classified these into four different categories: Type I and Type II reinforcement, punishment, and Type III. Type I procedures have used positive reinforcement contingent upon the occurrence of appropriate bowel movements. This approach is seen in the work of Bach and Moylan (5), Young and Goldsmith (45), Plachetta (33), Keehn (24), Neale (29), and Young (44). In each of these studies, reinforcement contingencies were specified so that positive reinforcement was delivered when the child had a bowel movement while sitting on the commode. In many instances these bowel movements had been produced by the use of laxatives or enemas (29, 44).

The outcome of Type I reinforcement is generally positive, with over 90% of the 33 subjects achieving continence, which was maintained during follow-up for over 80%. However, most of these studies used single cases. Neal (29) recorded the results of training in a group of 4 children and Young (44) worked with 24 children. Young's sample (four to ten years old) was composed of children who soiled in the absence of the sensation to void when the internal anal sphincter was dilated. After removal of accumulated fecal material, the child was potted in the morning following the ingestion of a warm drink or food to initiate reflexive bowel movements. Defecation in the commode was reinforced. Twenty of the 24 subjects were given Senokot (a stool-softening laxative) nightly to help ensure defecation in the morning. A successful treatment outcome was achieved in 19 subjects, defined by closure of the internal sphincter, absence of feces in rectum, and 28 consecutive clean days, within 12 months ($\bar{x}$ = 5 months).

Type II procedures also used positive reinforcement, but in addition specified that reinforcement be contingent upon clean pants rather than only

appropriate toileting. Ayllon et al. (4), Pedrini and Pedrini (31), and Logan and Garner (27) each reported successful application of Type II reinforcement in the treatment of encopresis with single cases. Treatment duration averaged about 11 weeks. Logan and Garner (27) used a pant-alarm with a seven-year-old partially deaf child. Its buzzer sounded when he soiled his pants, and this resulted in his leaving the room, having to clean himself, and then returning to his class. Points that could be exchanged for tangible reinforcers were awarded for each hour that the child was able to keep the buzzer silent.

In contrast to the above procedures, Edelman (13) and Friendan and Van Handel (19) relied exclusively on punishment in the treatment of soiling. Edelman (13) used a 30-minute confinement to the bedroom following each episode of soiling by a 12-year-old female, and Friendan and Van Handel (19) made their subject clean the soiled clothes and wash them with strong soap and cold water as punishment for soiling. In each case treatment was successful but the duration was relatively long, 41 and 20 weeks respectively. Although punishment procedures are periodically effective with children who display encopresis, the potential for eliciting emotional responses, promoting negative parent/child interaction which may in turn lead to excessive retention, may contraindicate their use without additional positive reinforcement contingencies.

Doleys (9) refers to a fourth category of program, Type III. These programs are more comprehensive and complex and typically involve the combined use of punishment and positive reinforcement. In addition, these treatments often use laxatives to promote frequent bowel movements and enemas to prevent the accumulation of feces. Reports by Gelber and Meyer (22) Ashkenazi (3), Doleys and Arnold (10), Doleys et al. (11), Wright (40, 41), and Wright and Walker (42) have described several Type III programs.

Gelber and Meyer (22) report the successful application of Type I reinforcement, punishment for soiled pants, and periodic pant checks in a 13-year-old male. Soiling was eliminated within 9 weeks and continence maintained over a 24-week follow-up. Ashkenazi (3) used a similar program with 18 encopretics, 6 of whom were identified as pot-phobics. These children were successfully treated by the use of reinforcement of successive approximations to sitting on the commode, usually after the insertion of a glycerine suppository to promote a bowel movement. Positive reinforcement was contingent upon defecation in the absence of soiling during the day. Suppositories were faded out after five consecutive days of appropriate toileting. Sixteen of 18 subjects were successfully treated in 3 to 9 weeks with maintained continence at a six-month follow-up.

Studies by Doleys (10, 11) examined a three-part program that included periodic pant checks, full cleanliness training contingent upon soiling, and positive reinforcement for appropriate toileting behavior. Depending upon

the age and availability of the child, parents were initially requested to check the child's pants on a regular schedule, every one or two hours. Positive verbal reinforcement and feedback were given if the child's pants were clean. Younger children or encopretics who had excessive retention were prompted to toilet themselves or placed on the commode for a ten-minute period after the pant checks. The discovery of soiled clothing was followed by full cleanliness training (18) which involved parental expression of displeasure, the child washing his underpants and trousers for 20 minutes, and the child taking a bath to clean himself for 20 minutes in cool water. The parents were further instructed to be very nonchalant about full cleanliness training and to verbalize repeatedly to the child the reason for this training and how it could be avoided. Additionally, children were not allowed to terminate a training episode if they were disruptive, to prevent possibility of parents' reinforcing disruptive behavior. The third part of this program used token reinforcements in the form of stars or colored squares which were displayed on a chart, contingent upon self-initiated bowel movements. When the child had earned a predetermined number of tokens, he could have a previously identified back-up reinforcer, selected by the child and displayed in the bathroom to help ensure continued motivation.

With this program, soiling was eliminated in all four subjects in a four- to ten-week period. One subject relapsed during follow-up as a result of parental noncompliance with the follow-up regimen. Recently the use of suppositories to promote regular bowel movements and to help prevent impactions has been added to the program. The suppositories are given in the morning after the child has gone two days without a bowel movement.

Wright (40, 41, 42) incorporated the use of positive reinforcement, punishment, periodic potting, enemas, and suppositories in his program. Following a thorough evaluation of the child's problem, the parents were instructed in the details of the program, emphasizing the need for regular evacuation and the importance of training the child to accept the responsibility for his own behavior and the development and strengthening of good toileting habits. The treatment began with a thorough evacuation, often including the use of enemas. The child was potted regularly in the morning and reinforced for the passage of stools. If the child did not defecate on his own, glycerine suppositories were used to ensure that a bowel movement was induced prior to the child leaving for school. Rewards were given for induced bowel movements, but their magnitude was smaller than those given for self-initiated bowel movements. If the passage of feces did not occur prior to school, an enema was used to produce colonic evacuation. The frequency with which enemas were used was controlled, and diet was adjusted to help increase the likelihood of regular bowel movements. The child's clothing was checked at the end of the day and he received a positive reinforcer if no soiling had occurred. Soiling was punished by restriction or loss of privileges.

Continued contact was maintained while the program was in process, and consistency in their application of the program was emphasized to the parents. A decrease or lack of parental cooperation and compliance is frequently observed when the child begins to display appropriate toileting. This often results in a recurrence of soiling behavior. Phasing out the program began when two consecutive weeks of nonsoiling had been observed. During the phasing-out period, the child was removed from the program for a predetermined number of days each week. An accident resulted in the child being returned to the program for a greater number of days during the week than prior to the accident.

Wright (41) reported data on the application of this procedure in 14 subjects three to nine years of age. All of the cases were successfully treated in an average of 16.9 weeks (range 10 to 38 weeks). Only one child relapsed at six-month follow-up.

Direct conditioning of the anal sphincter has been attempted in some instances as a way to alleviate fecal incontinence. Kohlenberg (25) used a balloon-type apparatus inserted in the rectum and attached to a tube filled with colored water as a way to provide feedback to the subject during conditioning. Constriction of anal sphincters raised the level of the fluid and was rewarded with monetary reinforcement. This procedure was tried with a 13-year-old secondary encopretic who demonstrated consistent soiling caused by a dilated sphincter. A similar procedure was used by Engle et al. (14) with seven patients. Follow-up visits at six months to five years after treatment showed maintenance of acquired continence in five of the seven cases.

Although Levine (26) observed that 30% of the children he examined for encopresis also had enuresis, there has been little discussion of treatment tactics in these cases. Doleys et al. (11) and Edelman (13) found the two behaviors to be functionally independent. Elimination of either encopresis or enuresis did not appear to affect the frequency of the other. In both studies soiling was treated initially. Epstein and McCoy (15), however, did observe an increase in bowel control in a three-year-old child with Hirschsprung's disease following bladder control training for enuresis.

SUMMARY

Encopresis continues to be a somewhat ill-defined, relatively frequent, and little-researched disorder. Although a single classification scheme has not been accepted, descriptive labels such as continuous, discontinuous, retentive, nonretentive, stress-induced, and manipulative encopresis are regularly used in the literature. Each of these types of encopresis appears to

need a different treatment approach, beyond the importance of considering each child and his family individually.

Research on the treatment of encopresis has suffered from the absence of an adequate description of the problem, the use of small numbers of subjects, and a lack of comparative well-controlled studies. Verbal psychotherapy and play therapy do not appear to be efficient or efficacious. The sole use of laxatives and enemas ignores the complexity of encopresis and at best leads to temporary remission. Behavioral-conditioning procedures have shown promise. Those relying on one principle or procedure—for example, positive reinforcement or punishment—are less effective than more complex multifaceted approaches. Programs combining the use of medical regimens with behavioral procedures appear to be the most effective.

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The Comprehensive Handbook of Behavioral Medicine, Volume 2

CHAPTER 8
The Gastrointestinal System: Practices And Promises of Behavioral Approaches

C. Barr Taylor

There has been surprisingly little attention paid to the use of behavioral treatments for gastrointestinal system disorders. The most extensive work has involved biofeedback control for esophageal and rectal sphincter tension, with only a few studies addressing treatment of other gastrointestinal problems. In this chapter we will review the behavioral treatments for gastrointestinal system disorders, first by symptom and then by specific organ dysfunction. Anorexia will be discussed in a separate section (see Chapter 6, this volume). The behavioral treatments for constipation and diarrhea associated with encopresis will also be presented elsewhere (see Chapter 7, this volume).

VOMITING AND NAUSEA

Several authors have described techniques to treat chronic ruminative vomiting in infants, a condition characterized by "bringing up food without nausea, retching or disgust. The food is then ejected from the mouth (if liquid, allowed to run out), or reswallowed." This behavior appears to be voluntary in the sense that infants actively engage in behaviors to induce the rumination. The incidence of rumination has not been reported, but it is a very serious condition when it occurs. Kanner (17) noted that 11 of 52 ruminating babies in one group died; Gaddini and Gaddini (13) reported death in one of six cases; and Sajwaj, Libet, and Agras (21) reported that one in eight patients died. Death is related to malnutrition, dehydration, and lowered resistance to disease.

Various techniques have been used to treat infant rumination. Kanner (17) reported that surgery, drugs, mechanical devices (e.g., esophageal blocks), feedings of food thickened with farina and other substances have produced varying success. High levels of attention consistently lead to a reduction in rumination and an increase in weight, which suggests that ruminative behavior is not contingent on attention.

Several behavioral programs have been used to treat infantile ruminative vomiting. In an early study, Lang and Melamed (19) used aversive conditions to treat a life-threatening case of persistent vomiting and rumination in a nine-month-old baby. During baseline, the authors demonstrated that the onset of vomiting was accompanied by vigorous throat movements. A brief, repeated electric shock was administered to the infant's thigh each time he began to vomit and continued until the vomiting ended. By the sixth session, the child no longer vomited, and no further vomiting was present at five months and one-year follow-ups. Aversive conditioning with electrical shock was also employed by Cunningham, Linshied, and Toister (10) and other authors (14) to achieve rapid elimination of the symptom in infants. Bright and Whaley (6) attempted to eliminate regurgitation and vomiting in a retarded boy with Tabasco-brand pepper sauce before resorting to shock. The pepper sauce was sprinkled on the vomitus in the child's mouth. Substantial reduction in regurgitation and rumination resulted, but neither was eliminated. Subsequently, shock eliminated both behaviors within three days.

The use of shock with infants is a disagreeable procedure and at least one alternative, equally effective aversive conditioning technique has been developed. In a study using a brief reversal, Sajwaj, Libet, and Agras (21) demonstrated that 10 cc of unsweetened lemon juice squirted into the child's mouth when he began prevomiting tonque movements was able to eliminate the vomiting and regurgitation symptoms. During the baseline, rumination occurred during 40% to 70% of observed ten-second intervals. Within two days of introducing the lemon therapy, rumination was present in only 10% of observed intervals. After a week of therapy, the authors briefly stopped therapy to determine if the rumination would return to pretreatment level. During this day, ruminations returned to an interval frequency of 35% to 65%, and immediately returned to less than 10% when therapy was reinstituted. The authors note that factors other than lemon juice may have been critical for successful treatment. For example, the interruption of the rumination behavior, the forceful injection of a fluid into the infant's mouth, the temperature difference between the lemon juice (room temperature) and the mouth fluids, and the attention accompanying the administration of the lemon juice were present during treatment.

Several studies have focused on the use of aversive techniques to treat chronic ruminative vomiting in mentally retarded adults and teenagers. White and Taylor (28), Kohlenberg (18), Luckey, Watson, and Musick (20)

have demonstrated that aversive techniques (usually shock) are effective in reducing or eliminating chronic ruminative vomiting in mentally retarded individuals.

Wolf, Brinbrauer, Williams, and Lawler (30) present the case of a 19-year old retarded girl whose vomiting appeared to be maintained by the consequence of being removed from a classroom following vomiting. When she was not removed following vomiting, the vomiting was reduced to zero in six weeks. Azrin and Wislowski (5) used positive practice and self-correction to eliminate habitual vomiting with a 36-year-old profoundly retarded woman. Whenever she vomited, she was required to clean it up, change her clothes and her bedsheets if they had been soiled, a procedure they call self-correction. Her vomiting was eliminated within five weeks and had not recurred at follow-up one year later. These procedures can both be viewed as aversive conditioning.

PERSISTENT NAUSEA AND VOMITING IN ADULTS

Persistent nausea without organic cause is common in medical populations (8). In 77 cases of persistent vomiting, Swanson et al. (25) felt that stress was a major precipitating factor in 39% of the cases and depression in 18%. There have been several studies that have addressed the use of behavioral techniques to treat nausea and vomiting in adults. Ingersoll and Curry (16) used social and activity reinforcers to alter a) the amount of time food was retained, and b) the type of food and drink. Treatment lasted for five days, after which the patient was no longer vomiting and she was not vomiting at one-year follow-up by self-report. Alford, Blanchard, and Buckley (1) used contingent social contact and reduced attention to eliminate "hysterical vomiting" in a 17-year-old female. There was no reported recurrence seven months after treatment stopped. Tasto and Chesney (26) used emotive imagery to decondition nausea in a 25-year-old engineer who was asked to imagine stimuli which produced the vomiting and then switch immediately to pleasant scenes. The patient reported no symptoms at one-year follow-up.

Vomiting and nausea are frequent side effects of many medications, and nausea may become conditioned to many stimuli associated with the treatment setting, especially chemotherapeutic agents. The following tragic case illustrates a common history of many cancer patients.

Carl was a 25-year-old white male who was discovered to have acute myelogenous leukemia in 1975. He began a course of antineoplastic drugs and developed severe vomiting which required large doses of antinausea drugs. During the second course of treatment, his nausea began to generalize to medical personnel with white coats; he would vomit when anyone with a white coat entered the room. The vomiting further generalized to the

treatment cart, nurses, and eventually to the hospital itself. He would vomit when he entered the doors to the hospital, before he was to begin a new treatment series. During his final hospitalization, he became nauseous to food and began to refuse food. A psychiatric consultation was requested at this time.

The patient was given a short course of desensitization (three sessions) using hypnosis, in which he was instructed to imagine a pleasant situation and then switch to a scene that produced nausea. The patient was rapidly deteriorating from his disease at this time, and although he was able to reduce and then stop his antinausea medication within a week of beginning this desensitization, too many other factors were involved in this case at that time to determine the specific contribution of the desensitization. He died two weeks after desensitization was begun.

The patient developed a classically conditioned vomiting response to many stimuli. In light of the impressive and immediate conditioning effects occurring in natural environments with animals given food that produces nausea, it it surprising that vomiting is not a more serious problem with chemotherapeutic agents. This is a rich area of study for researchers interested in behavioral medicine.

DIARRHEA AND IRRITABLE BOWEL SYNDROME

Although diarrhea and the irritable bowel syndrome are often caused by different problems, both relate to increased gastric motility and will be discussed together. Often diarrhea is a symptom of the irritable bowel syndrome although abdominal pain and alternating diarrhea and constipation may be the representing complaint.

The irritable bowel syndrome is a common problem which accounts for up to 70% of referrals to gastroenterologists. Recent studies have demonstrated the following basic points about the irritable bowel syndrome:

a) in general with "spastic colon," colonic motility is increased,
b) with painless diarrhea, sigmoid motility is decreased,
c) there is increased reactivity to parasympathomimetic drugs,
d) there is an exaggerated response to cholecystokinin,
e) basic electric rhythm is sometimes altered,
f) stress affects bowel function.

The effects of stress on gastric motility were well demonstrated in a series of classic studies by Almy et al. (2, 3, 4). For instance, while recording directly from the rectum of a medical student who had agreed to undertake a

sigmoidoscopy, Almy told the student that he had found a cancer. The student's contractility immediately increased and the mucosa became engorged. When the student was told that he didn't really have cancer, his contractility immediately returned to normal, and the engorgement left. In similar studies, Almy demonstrated that colonic motility could be increased during stressful interviews, and with anger. Many of us have experienced diarrhea before an important exam or constipation when traveling away from home. Partially on the basis of these observations, gastroenterologists prescribe antianxiety agents to patients with irritable bowel syndrome, although only a few controlled studies have attempted to demonstrate the effectiveness of these agents. Even more alarming, and of critical importance to behavioral researchers in this area who may wish to compare behavioral treatments to pharmacological ones, of 400 papers describing the effects of 18 different anticholinergic drugs, not one controlled study showed a physiological effect on colonic motility when the drugs were given orally, yet anticholinergic medications continue to be recommended to treat this disorder.

The behavioral approaches to the irritable bowel syndrome usually focus on decreasing colonic motility in the case of biofeedback or reducting stress in the case of desensitization and related approaches.

Cohen and Reed (9) used systematic desensitization to treat two patients with diarrhea exacerbated when the patients were required to travel. Using freedom of activity and frequency of self-reported diarrhea as outcome measures, the patients reported modest gains that were maintained at 6- and 12-month follow-up. Hedberg (15) also used systematic desensitization to treat a patient with chronic diarrhea. His patient averaged ten bowel movements per day. Bowel control was achieved by the eighth session and was maintained at a two-month follow-up.

Biofeedback has also been used to treat diarrhea. The use of biofeedback is based on a number of studies which have demonstrated that visceral biofeedback can be used to change gastrointestinal motility in animals. Furman (12) used an ingenious technique of providing feedback of bowel sounds, recorded with an electronic stethoscope, to his patients. He assumed that bowel sounds were related to functional diarrhea. Patients were taught to increase or decrease peristaltic activity. The author reports that within five training sessions, all patients showed some degree of control over their intestinal motility and apparently experienced symptomatic improvement which related to success with controlling gastrointestinal motility.

Bueno-Miranda, Cerulli, and Schuster (7) provided direct feedback of rectosigmoid distension to patients with irritable bowel syndrome, using the same techniques that have been developed for biofeedback treatment of fecal incontinence. In this system, three balloons are inserted rectally. The

uppermost balloon is lodged in the rectosigmoid space and measures distension in that area. The next balloon is positioned in the internal sphincter and the third balloon in the external sphincter. Subjects were instructed to both increase and decrease distension in the rectosigmoid space.

The procedure was tried with 21 patients, ages 15 to 71, with an average duration of symptoms of seven years. Fourteen patients were able to increase distension by 34% and decrease distension by an average of 29.7%. The same patients were able to continue the suppression eight weeks later. The effects on functional bowel syndrome were not reported. These preliminary results are exciting, and much more work needs to be done in this area.

FECAL INCONTINENCE

Biofeedback techniques have been successfully developed for treating fecal incontinence. Since the "state of the art" has been nicely reviewed elsewhere (11), we will review only the major findings here. Engel (11) used internal and external sphincter balloons to record and eventually to condition fecal incontinence. By first inserting a rectal balloon, followed by an internal and then an external balloon, he was able to elicit repeated rectal sphincter reflexes without relying on "natural bowel movements." To learn sphincter control, subjects were verbally reinforced for developing external sphincter pressure which corresponded with a predetermined response criteria for internal sphincter. Once the patient was constantly emitting appropriate sphincter responses, the visual feedback was withheld during progressively greater numbers of trials while the patient continued to attempt to control his responses. Forty patients were treated with this procedure. The patients ranged from 6 to 96 years; 28 of the patients responded well as evidenced by disappearance of incontinence or by decrease in frequency of incontinence of at least 90%.

The same group has also demonstrated that similar techniques can be used to control internal sphincter contraction. Schuster (22, 23) has demonstrated, for instance, that lower esophageal sphincter contraction can be increased 100% when provided as visual feedback to the patient (although this may not achieve a normal resting pressure).

PEPTIC ULCER DISEASE

Peptic ulcer diease is one of the most common human ailments. Although peptic activity (pepsin and acid) is the ultimate damaging agent responsible for mucosal ulceration, many other factors influence the development of ulcers, including the mucosal barrier to ion diffusion, the amount and type of

mucus, mucosal resistance, mucosal blood flow, acid-pepsin activity (ulcers can develop in the *absence* of acid), vagal activity, gastric secretion, and parietal cell mass (24). Psychosocial factors also contribute to the development of peptic ulcer disease. The few studies of behavioral interventions have focused on reducing gastric acid secretion.

In an early study, Welgan (27) continuously aspirated gastric secretions and measured the pH, 15 periods of auditory and visual feedback alternated with 15 minutes of rest. The group data suggested that feedback and instructions reduced the acid secretion. Aspirating gastric acid is a cumbersome and inaccurate procedure. Whitehead, Renault, and Goldiamond (29) developed an ingenious technique to provide direct intragastric acid secretion readings. Subjects swallowed a plastic tube containing a pH detection tube and two other tubes; one used to inject sodium bicarbonate and another to drive an electric relay signaling that pH had dropped to 2. When the pH dropped to 2, sodium bicarbonate was injected and raised the pH to 7. The amount of sodium bicarbonate was used as the independent measure of gastric acid secretion. In the experiment, four subjects underwent a design involving baseline, followed by instructions to increase gastric acid secretion, and then instructions to decrease gastric acid secretion. During the increase or decrease secretion periods, subjects were given visual feedback of their gastric acid secretion as determined from the sodium bicarbonate. Two subjects were able to both increase and decrease gastric acid secretion; one subject was able to increase only and one subject showed no changes in either condition. The authors suggested that the latter subject had been conditioned to exhibit gastric emptying. These two studies offer exciting directions for the possibility of operant conditioning of gastric acid secretion. Clearly, more studies need to be done in this area.

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Introduction to Pain Syndromes

Research on the mechanisms of pain regulation and control has undergone an explosion in recent years. On a basic science level, we have begun to unravel the biochemical mechanisms regulating pain perception in the brain; on the clinical level, we have developed an array of new interventions of potential benefit. Behavioral medicine has been a small part of this explosion. Pioneered by Fordyce in Seattle, operant techniques to treat chronic pain patients have become a well-accepted part of rehabilitation programs (4). The other major contributions from behavioral medicine have been the behavioral analysis of pain behaviors and the development and evaluation of specific procedures to control pain. In this section, we provide chapters relevant to each of these areas.

In the first chapter, Roberts describes the use of behavior modification programs in an inpatient setting. In reviewing outcome studies in this and similar programs, he notes that "little can be generalized from these few studies other than noting the encouraging possibilities of behavioral approaches." In fact, the assessment of chronic pain, or any pain, presents special problems for the behavioral researcher. Since pain is a subjective phenomenon, evaluation of outcome must rely on the kind of data that makes behaviorists most uneasy: Self-report. Although pain reports can be seen and analyzed as a type of verbal behavior, most of us assume that there is a subjective feeling of pain which usually accompanies the pain report and that this subjective feeling is what should be treated. Unfortunately, we have no way of measuring the subjective feelings of pain, just as we have no way of measuring the presence of fear, anger, or love.

Because of the subjective nature of this symptom, many studies have focused on pain-related behaviors that can be quantified, like activity (4), motor behaviors presumably related to pain, for example, jaw clenching (11), urine drug screens, number of days in the hospital (5), number of surgical procedures (5), and a variety of self-report variables (9). Together these measures provide a description of the effectiveness of a treatment program, but they do not allow for an evaluation of the contingencies affecting pain report. Unfortunately, there has been a tendency among behavioral

researchers in this area to generate nondata-based hypotheses. For instance, Fordyce's hypotheses that pain report is controlled by environmental influences, that pain medication reinforces pain report, and that the schedule of medication affects the report of pain are attractive but unproven.

In the next chapter, Corley and Zlutnick describe a model for inpatient psychiatric liaison and consultation for chronic pain patients. In this clinical paper, they provide salient advice for health-care professionals involved in consultation-liaison activity. The use of pain diaries is one technique they use to develop a base that provides information about the course and outcome of a particular intervention.

In the next two chapters, Epstein and Cinciripini, and Cinciripini, Williamson, and Epstein discuss the behavioral treatment of tension and migraine headaches. These two problems account for much human suffering; for example, several surveys have noted that as many as 10% of respondents complain of headache at any one time (8). Tension headaches provide a model for studying two problems relevant to the etiology of all psychophysiological disorders: Do symptoms develop relative to a discrete physiological event, and/or do individuals with a particular symptom discern physiological events in ways tangibly different from nonpain peers? These two questions have been intensively studied, and Epstein reports the relevant information from his and other studies of tension headache. On a clinical level, Epstein notes that relaxation and biofeedback produce similar results. In their section on migraine headaches, Cinciripini, Williamson, and Epstein pursue the question of how symptoms are developed and maintained. They provide a model for various interactive factors leading to the development and maintenance of migraine headache. As they noted, factors responsible for the development of symptoms of a disease may be quite different from those maintaining the existence of the symptom—an observation also applicable to hypertension and many other psychophysiological disorders. Reiser (7) has pursued a similar model based on a systems theory approach. Cinciripini et al. show the integration of physiological and behavioral systems with environment and cognitive factors in the programmatic assessment of pain. In the future, an integration of these areas may allow better definition of symptoms and more precise prescription of treatment for these disorders.

The section concludes with Melamed's chapter on pain problems in dentistry, particularly temporomandibular joint pain and dysfunction, and bruxism. In her review of the physiology and treatment of these conditions, she refers to two assessment methods relevant to many areas of behavioral medicine: The use of a mechanical device, a laminated plate called a "Bruxcore," which provides ongoing direct measurement of the target symptom, nocturnal bruxing, and a portable electromyograph which alerts the ambulatory patient when his masseter EMG activity exceeds a

predetermined range. This type of device and measurement instrument will undoubtedly play an increasingly important role in the field of behavioral medicine in the future.

These chapters all present the evaluation and treatment of clinical pain problems, and especially chronic pain problems. The other major area of behavioral research into acute and chronic pain has occurred in more focused laboratory studies where behavioral interventions have been used to reduce artificially induced pain. Important findings from these studies are:

Relaxation. In general, relaxation may reduce pain report and increase pain tolerance, especially when anxiety appears to contribute to the pain report (13).

Cognitive Variables. A number of cognitive variables affect reactions to pain. Instructions, attention-distraction, and a variety of strategies for reinterpreting the pain have all increased pain tolerance in experimental analogue situations. For instance, Wolf, Krasnegor, and Fair (14) asked subjects to imagine that they would receive $1000 if they delayed shouting "Stop" while receiving electrical pain stimulation. The group so instructed increased pain tolerance and pain sensitivity range compared to a control group. Nisbitt and Schachter (6) demonstrated that attribution markedly affects pain report. Other authors have shown that patients tolerate more pain when they have control over the pain situation (1, 13). Instructional variables like advanced preparation, where presurgery patients are told what to expect postoperatively, has a dramatic effect on reducing pain-medication requests (3).

Modeling. Many investigators have shown that modeling has a powerful effect on reducing pain report and increasing pain tolerance. For instance, Craig and Weiss (2) had subjects rate the intensity of incremental shocks when observing the rating of a confederate model. The subject modeling on a confederate exhibiting high-pain tolerance similarly exhibited a low-pain tolerance reported pain at lower levels. Unfortunately, the studies are not always consistent. Vernon (12) exposed hospitalized children to one of two films. One group saw children receiving injections without expressing pain or emotion; a second group saw a film in which children reacted to the injections. A control group saw no film. Using rated reactions to actual injections, the group who saw the realistic film exhibited the least pain. In an interesting study on a burn unit, Strauss et al. (10) analyzed the effect of social interaction and modeling on pain expression. The study was descriptive and not empirical, but the authors argue that patients learn to "lean on each other" for support and for pain-control techniques.

The use of cognitive strategies, modeling, biofeedback, and relaxation to reduce pain complaints and increase pain tolerance is an important area for future research.

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CHAPTER 9
The Behavioral Treatment of Pain

Alan H. Roberts

Pain is a puzzle to those who have it, those who treat it, and those who seek to understand it (6, 19, 23). *Chronic* pain is not only a puzzle, it is a personal, social, medical, and legal disaster for many who suffer it. Chronic pain is probably the greatest single health problem in the United States today in terms of the number of people involved and the financial costs. There are between 800,000 and 1,000,000 people immobilized by pain each day. Estimating $40 a day, as does the National Institute of Health, this adds up to $13 billion dollars a year in health-care costs associated with this problem (7). Viewed in terms of the individual patient, the costs of treating a person with low back pain may easily exceed $100,000 (8). A patient with low back pain who has been out of work for six months has only a 50% chance of ever returning to work (29).

The health-care resources required by pain patients are staggering. For example, in the State of Washington, 3 to 5% of the claimants for workman's compensation are for low back pain. These 3 to 5% of those claiming compensation use up to 45% of the annual medical budget. Using a somewhat different classification system, California workman's compensation reports that approximately 15% of their claims are for back pain and that these individuals use up to 85% of their annual medical budget (18). These figures make it easy to understand the rapidly increasing interest in pain and its associated problems as well as the proliferation of pain clinics and pain treatment centers around the United States. Because of the difficulties associated with the diagnosis and treatment of chronic pain problems, operant behavioral approaches to pain have attracted considerable interest since the time they were first described in 1968 (12, 13).

HISTORY

The reconceptualization of the problem of chronic pain from a disease model to a behavioral model is uniquely the work of Wilbert E. Fordyce and his colleagues (12, 13). Their 1968 reports were the first suggesting this application of behavior modification techniques. Their contribution cannot be taken lightly, since it represents a major conceptual restructuring from the disease model of pain which was the only clinical model available at that time.

In 1969, influenced and encouraged by Fordyce, an operant pain treatment program was started in the Department of Physical Medicine and Rehabilitation at the University of Minnesota Medical School. Both Fordyce's original program at Washington and the Minnesota program have remained devoted to small-volume, high-quality, research-oriented treatment based solely on behavioral principles.

In 1973 the Washington group (14) described their treatment program in more detail than they had in earlier papers and at the same time reported a follow-up study of patients treated in their program between October 1967 and March 1971. The findings of that study were impressive, especially in view of the high levels of chronicity and disability among the patients treated. A similar follow-up study from the Minnesota program is reported by Anderson et al. (2). Since 1973, large numbers of pain treatment programs have been developed nationally, with many using behavioral techniques at least as a part of their treatment protocol.

ACUTE AND CHRONIC PAIN

Chronic pain is most clearly differentiated from acute pain on the basis of time since onset. The longer pain persists without effective medical intervention, the greater the opportunity for environmental operants to become effective. As pain persists it becomes less and less likely that the traditional disease model of pain will be applicable to understanding or treating the pain.

Acute pain is pain of relatively recent origin attributable to disease or trauma that can be identified. It usually responds to definitive medical or surgical interventions. Acute pain will typically have a history, distribution, and quality consistent with both the amount and the type of identifiable underlying pathology. Acute pain patients may have many of the same psychological symptoms found with chronic pain, including dysphoria, anxiety, autonomic arousal, or cognitive impairment. All of these may be associated with acute distress.

In chronic pain, the pain persists despite medical or surgical intervention. The continuing pain involves the physician as well as the patient in increasing

emotional discomfort (33). The early identification of chronicity is important, since interventions that are appropriate for acute pain are probably contraindicated and likely to exacerbate chronic pain. Traditional disease model interventions for acute pain, including diagnostic procedures, conservative treatments, or surgery may all serve as reinforcers for pain behavior with increasing intensity as time passes. Whether chronic pain is defined on the basis of time alone or on the basis of time together with identifiable pain behaviors, it is clear from the definition that, if you have chronic pain, the usual interventions will not have worked and are not appropriate.

ETIOLOGY AND DEVELOPMENT OF CHRONIC PAIN

Chronic pain has a classic and easily describable etiology and course. First, symptoms develop. The origin of the symptoms may be pathological physiologic, emotional, or both. The patient seeks treatment, which is either successful or unsuccessful. If the treatment is successful, chronic pain does not develop. If the treatment fails, there are repeated attempts to diagnose and treat the disorder. These attempts commonly lead to the overuse of medication and of the health-care system often through doctor shopping or "multiple doctoring." If after three to four months the pain is not successfully treated, it can be considered to be chronic, because treatments have not been successful and because sufficient time has elapsed for learning factors to have complicated the history and course of the pain and to have influenced the behavior of the patient and his family.

The result may be the development of a "professional patient" (33). The patient is continually reinforced in his fantasies of relief by health-care professionals. Physicians are reinforced in their relationships with the patients by temporary remission which is often a placebo effect. Patients usually seek medical intervention when their pain is at its worst and are therefore likely to get better no matter what is done. Physicians are often intrigued by the challenge of cases like this, at least for a time; the longer a patient has been treated without effect, the more a newly involved professional person might hope that he will discover an etiology and treatment that will make a difference.

After a physician has dealt with one of these patients for a while without success the next step is usually rejection of the patient, often by means of a psychological diagnosis such as hysteric, suggestable, conversion reaction, secondary gain, psychogenic pain, imaginary pain, "crock," "turkey," or "difficult." Sometimes the patient is told that the pain is in his head, or this message is indirectly communicated by referring the patient to a psychologist or psychiatrist for evaluation.

The usual psychotherapies do not work well with patients like this, and often the patient is advised to go home and live with his pain. This typically produces considerable anger and rage on the part of the patient and again leads to doctor shopping. Since the patient knows that he hurts, being told that the pain is imaginary seems absurd to him, and the health-care professionals involved lose credibility. From these interactions among physicians, patients, and health-care systems an iatrogenic illness develops which includes chemical dependency, increased pain associated with the long-term use of analgesics, pain secondary to or exacerbated by surgery, and the drug-induced psychological symptoms of depression, anxiety, sleeplessness, and social withdrawal.

Reinforcements accrue to patients in various ways. These may include attention from family members, time out from unpleasant tasks and duties such as a job that is not liked or unpleasant sexual relationships, attention from physicians and other health-care professionals, financial rewards in the form of workman's compensation, or the fantasy of large financial gain from pending lawsuits.

Pain medications particularly contribute to chronicity since they addict, and produce hyperalgesia (38). They are usually administered *prn*, which reinforces pain behaviors, viz. the patient must have the pain in order to justify taking addicting or dependency-producing medications. Taking the medications at that time reinforces the pain and its associated behaviors. It has been shown that learning plays a prominent role in both habituation and increased sensitivity to pain (1, 10, 22, 28, 34).

From these complex and interacting variables chronic disability develops, including deteriorating marital and family relationships, feelings of worthlessness and helplessness, and inability to perform the usual tasks and responsibilities. Rage and anger at the system in which the patient is helplessly entangled also emerges since there is no other place to which the patient can turn for help. This leads to further exacerbation of the psychological symptoms often thought to be the cause of chronic pain rather than its effect (3, 29). In addition to direct and passive expressions of anger, these symptoms include depression, anxiety, sleeplessness, and the excessive use of repression and denial, as well as somatic overconcern and hypochondriasis. These symptoms support the diagnosis of the patient's problem as psychogenic. At the same time, they are also the symptoms commonly associated with any progressive chronic disabling illness.

BEHAVIOR MODIFICATION IN AN INPATIENT SETTING

The use of operant principles in the treatment of pain varies from program to program both qualitatively and quantitatively. The specifics of these programs may at times make a significant difference in outcome. The details

of evaluation and treatment described in this report are those of the Pain Clinic and Pain Treatment Program in the Department of Physical Medicine and Rehabilitation, University of Minnesota. The basic principles used in modifying chronic pain behaviors have been described by Fordyce (14, 15, 16) and Roberts (27).

Goals

The optimum outcome of an inpatient pain treatment program is to return the patient to his usual home and work situation. Our behavioral goals include an increase in physical activities to normal levels consistent with the patient's age, sex, or physical limitations, elimination of all nonessential medication including pain-relieving and psychoactive drugs, return to a home situation with normal activity levels, work for the patient in or out of the home following discharge, relationships with family members and others without the use of pain to control the interaction, and elimination of health care for pain. Health care should be confined to that which is necessary for medical problems not related to pain. Finally, the patient should stop exhibiting verbal and other behavioral evidence of pain. The degree to which these objectives can be met varies from patient to patient as well as across treatment programs.

Evaluation of Patients

An operant inpatient treatment program may average eight weeks of treatment at a cost of over $12,000. Although this is very little compared to the costs of untreated chronic pain, it is high enough to justify reducing the risks of treatment failures. The Minnesota program evaluates patients for admission to the inpatient treatment program during a one-day outpatient visit to a general evaluation clinic for chronic pain by the patient and his spouse, or some other person close to the patient if he is not married. Following the clinic visit, recommendations are made for treatment approaches that might benefit the patient, including a variety of nonbehavioral treatments, changes in medication, transcutaneous electrical stimulation, biofeedback, referral to other medical specialists, or admission to the operant pain treatment program. During this evaluation, the patient is examined by physicians at the pain clinic, and the patient and his family member are interviewed together and separately by a social worker and a psychologist. Psychological tests are administered to both the patient and the family member. Other professional staff may be asked to evaluate the patients; for example, a counseling psychologist may evaluate the patient when there are questions concerning employment or employability. Patients are accepted for inpatient treatment independent of any distinction between organic pathology or psychogenic origins for pain. We feel it is exceedingly important that this be communicated to the patient and his family members.

Reasons for rejecting patients for inpatient operant treatment include: 1) there are other less expensive, appropriate treatment approaches that should be tried or ruled out prior to inpatient treatment; 2) absent or poor family support for treatment; 3) chemical dependency is the *primary* problem and pain is used as an excuse for using and obtaining drugs; when the diagnosis of primary addiction or dependency is made, the patient is referred to an appropriate treatment program and told that if he continues to have pain after successful detoxification and treatment, he will be reconsidered for treatment; 4) a few patients seen in the clinic are found to be suffering from a schizophrenic disorder with delusions of pain as one symptom, and we have chosen to exclude these from our program; 5) medical problems that could not be ignored if the patient were admitted to the pain program—for example, if a patient has heart disease that might be exacerbated by exercise and activity or a cardiac condition that might produce symptoms or complaints that cannot be ignored by the staff, he is excluded from treatment; other types of medical problems are not exclusion criteria—for example, diabetics have been treated for pain with the understanding that they will control their own diabetic medication and that will be discharged if they do not treat themselves appropriately; we have also treated paraplegics and others with severe but stable disability not related to pain as long as we felt that staff could discriminate between pain complaints and appropriate concerns the patient might have about his medical condition; 6) patients are excluded if their physicians are not willing to tell the treatment team and the patient that participation in the program will not exacerbate their problem; 7) high levels of activity coupled with high levels of verbal complaint are an exclusion criterion; since the outcome of a pain treatment program is increased activity, it is not reasonable to admit a patient who is functioning at normal or near normal levels simply because he complains a lot; 8) patients with pending lawsuits are excluded unless their attorney is willing to say in writing that a positive treatment outcome will not materially affect the outcome of litigation; the frequency with which lawyers refuse to write such a letter and the anger with which our suggestion to the attorney is received have reinforced our decision to exclude this group of patients; on the other hand, when lawyers have provided this reassurance to their clients, treatment outcome has invariably been a success.

Low motivation is not a reason for outright rejection by the evaluation team even though such judgments can be made with a high probability of success. Usually patients with low motivation exclude themselves; almost 40% of patients accepted for inpatient treatment refuse. These are often individuals with poor job potential and high levels of compensation or individuals with family members who are highly reinforcing of their pain behaviors who do not encourage the patient to be treated.

General Considerations

The techniques of behavior modification used in an inpatient pain treatment program are primarily positive reinforcement, shaping, contingency contracting, and modeling. For positive reinforcement we use a wide variety of rewards for behaviors that we wish to strengthen. A conscious attempt is made to avoid reinforcers that are not fully under the control of the staff. For example, cigarettes and television watching are avoided because the patient might have access to them from sources other than those controlled by the staff. Reinforcers are kept simple whenever possible.

The most common reinforcer is praise and attention from members of the health-care team. Since the patient usually has a long history of using the health-care system, this kind of attention is almost always reinforcing. Graphs that record the patient's progress on a day-by-day basis are positively reinforcing to most of the patients treated. Weekend passes are under staff control and are used as reinforcers for continued progress when appropriate. Additional reinforcers may be chosen, such as providing "diet pop" following the completion of exercises in the therapeutic area if the patient has expressed a strong wish for it.

Activities that the patient likes to do are often used by the occupational therapy staff to reinforce the patient, especially during another activity that requires positive reinforcement. An example of this is a sitting activity during which the patient is required to sit for progressively longer periods each day. The therapist may provide a task that the patient enjoys for the period when he is required to be sitting.

Shaping is an integral part of the treatment strategy. The desired behaviors are divided into successive steps which are taught one by one. Each of these steps is rewarded and the patient moves on to the next step after he has completed the previous one. In this way, new behaviors are learned gradually as the patient approximates normal levels of activity.

Modeling is used both consciously and unconsciously by the treatment staff. Commonly, patients who have been successfully treated in the program are introduced to a new patient who enters treatment. In the Minnesota program, the director has a chronic low back problem and commonly participates in exercises and activities with the patients who are able to observe that he is functioning normally with respect to his job and activities and that he can do the things they are being asked to do.

The contingency contract is an important part of the program. Generally the patient, his spouse, and sometimes other significant people such as children, close relatives, or friends agree to a contract describing the behavioral goals of the program, the reinforcements that will be used, the duration of the program, and other important areas. The contract always

involves an exchange between the patient, the staff, and others who help negotiate the agreement. An example of a contingency contract used in the Minnesota program is shown in Figure 1.

During the treatment program all identifiable pain behaviors are ignored by all of the staff. If the patient winces, complains, screams, or talks about pain, staff members ignore it by behaving as if they had not heard, by changing the subject, or, if necessary, by walking away from the patient. Staff must be sensitive to the fact that ignoring (i.e., not reinforcing) a well-established response will tend to increase rather than decrease that response initially.

It is important for the staff to make continuous efforts to discriminate between what a person says about his pain and what the patient actually does about it. The focus is on behavior. The amount of pain that is described by the patient may change very little by the end of the treatment program, but what he does about the pain will change significantly. Patients' verbal complaints about pain are not themselves a measure of success or failure of treatment; activity levels are.

Figure 1
Pain Treatment Program Contract

The purpose of this contract is for me, _____, the patient, to understand and agree with _____, representing the treatment team, and _____, a member of my family or someone else who is significant to me ("significant other"), on the following:

1. The program will be directed toward my learning to live with pain and changing those of my actions and attitudes ("behaviors") that are associated with the pain. During the evaluation week the staff, my significant others and I have identified my pains as well as the behaviors that communicate to other people that I am in pain. Some of these behaviors include the following:

   _____

   _____

   _____

   I understand that my pains, and all of my behaviors relating to pain, will be completely ignored by the treatment team.

2. I give my permission to my significant others, including _____, _____, _____, _____, to ignore my pains, complaints of pains, and behaviors related to pain while I am in the program and after I am discharged in order to help me manage my life in ways that will be more satisfying to all of us.

3. Our goal is to increase my activities in kind and amount to the point at which I can do things considered normal for a person of my age and sex. More specifically, I have the following goals:

   _____

   _____

   _____

4. Pain medications will be generally eliminated from my "pain cocktail" as my activity level increases. Once my program begins I agree to dispose of any other medications I have at home or in the hospital. At time of discharge, all pain-related medications I have brought to the hospital will be destroyed by the pharmacy.
5. Any information about the program will be available to me and my significant other during working hours, except for the specific amount of medication in my "pain cocktail." However, I also understand that I will be told as soon as my "pain cocktail" includes NO medicine.
6. Once admitted, I will be evaluated by the treatment team. Then, they and I together will set up my activity schedule and determine further goals. After several weeks I will be given a work assignment, which I understand is an important part of the program. Its purpose is to help ensure the chances that what I have learned about controlling my pain will carry over to all other activities including employment, where that is appropriate.
7. I will keep graphs showing my progresss. I understand that I alone am responsible for these graphs and with help from the treatment team I will keep them up to date and available for inspection *at all times.*
8. Members of my family or others significant to me will be considered essential, active participants in this program; they will work with me, breaking my old habits and learning new ways I can live with my pain without being disabled by it. The following persons agree to participate when requested as much as three times per week during the treatment program:

   _____

   _____

   _____

   In addition, I understand that you may talk with or meet with other members of my family if that will improve the chances of maintaining my gains after I leave the hospital. I understand that I will be informed about this before they are contacted.
9. Based on my treatment needs, members of the treatment team will decide who can visit me in the hospital, and when, as well as the times for, my home visits.
10. If, for three consecutive days I do not improve my activities (as demonstrated in the graphs), my activity schedule goal will be lowered one step. In the event I do not improve during the next three days, this program will automatically terminate for me and I will be discharged from the hospital.
11. The treatment program will continue until I have maintained all activity and work goals for two full weeks. After that, I will participate in the four- to six-week outpatient and follow-up program, even though I have improved considerably by that time.

I understand and agree to the above program that has now been explained to my satisfaction.

_____ _____

Patient Date

_____

Team Representative

_____

Significant Other

Inpatient Evaluation

When a patient is accepted into the treatment program, he is admitted to the rehabilitation service for a one-week evaluation. During this evaluation week, the patient receives an examination that includes the evaluation of remaining medical problems. Pain behaviors and reinforcers are identified, and a baseline of medication consumption and physical activity is established. The times, frequencies, and patterns of pain behaviors are recorded by treatment team members.

Baseline medication use is evaluated by requesting patients to bring to the hospital a ten-day supply of all medications that they take at home. These are given to the nursing staff on admission, and patients are told to ask for them any time they want to during the evaluation week. Unless there is a clear danger to the patient, these medications are administered as requested without question. The nursing staff records the time and amount of every medication administered. These data are later used to provide the formula for a "pain cocktail."

The patient is assigned to occupational and physical therapists who, in consultation with a physician, spend the evaluation week choosing exercises and activities for the patient and determining the level at which the patient can exericise without encouragement or reinforcement. Exercises and activities that use a wide variety of muscle groups, particularly those that are weak or tense from disuse or misuse, are chosen for the patient. Activities that the patient does not ordinarily do because they are painful are emphasized—for example, sitting on a hard chair for long periods of time, standing, walking, bending, lifting, etc. An exercise or activity is included for anything that appears to cause difficulties.

At the end of the evaluation week a conference is held with all of the team members who worked with the patient and his family to plan the treatment program, including the pain cocktail, the activities that he will take part in, the rate at which the activities will be increased, the criterion level for each of the activities that will be required before he is discharged, and the reinforcers that will be used. A significant part of the conference is the physician's reassurance to the patient and his family that participating in the program will not be harmful to him and that he is capable of performing all of the exercises and activities that he will be asked to do. Following the evaluation conference, the treatment program begins. It usually lasts an additional five to seven weeks.

The Pain Cocktail

During the inpatient evaluation week, the patient takes all medications on a *prn* basis and the nursing staff records the amount and timing of medication.

At the end of the evaluation week, the physician calculates the average amount of each drug taken by the patient over a 24-hour period. The pharmacist compounds the pain cocktail so that when it is administered on a time-contingent basis—for example, every four hours—the patient will receive as much of the active ingredient of each of his medications as he was taking *prn*. He may refuse a dose of pain cocktail, but he cannot receive it later if it has been refused earlier. The next dose is brought at the scheduled time. The cocktail includes all pain-related and nonessential medications, including tranquilizers and antidepressants. These are combined in a pleasant-tasting vehicle that masks the taste of the component ingredients. Only occasionally does the pharmacy need more than one solution to contain all of the medications. A separate cocktail with barbiturates in addition to other drugs may be needed at bedtime. This is decreased on the same schedule as other medications.

The amount of the medicine in the pain cocktail is decreased by 20% per week. Although it is possible to reduce active ingredients faster or more slowly, the Minnesota experience shows that this rate minimizes withdrawal symptoms. Many patients set their own rate by voluntarily refusing the cocktail before the active ingredients have been eliminated. The patient is told that the medicine content is slowly decreased; however, he does not know exactly how much active ingredient is in the cocktail at any given time. The patient is informed by the physician when there are no longer any active drugs in the cocktail.

Essential medications are given to the patient for self-administration so the nursing staff does not become involved with the patient over medications. Since the patient will be self-administering these essential drugs at home, there is no reason why he cannot do this while in the hospital.

The Inpatient Treatment Team

Patients treated in the Minnesota inpatient program routinely have available to them dietitians, nurses, occupational therapists, pharmacists, physicians, physical therapists, clinical and counseling psychologists, a social worker, a work-assignment coordinator, and a work evaluator. Not all patients require the professional services of all these specialists.

The Physician's Role

The physician's responsibilities in an inpatient operant program are similar to those he would have when treating any chronically disabled patient. He is responsible for all medical aspects of evaluation and treatment. This includes medical and laboratory evaluations, prescribing medications, and working with other team members to choose and evaluate therapies. He also provides

medical sanction for the patient, his family, and the treatment team by assuring all concerned parties that medical matters are under control. He maintains communication with referring and family physicians and agencies to educate them about the treatment and to enlist their cooperation in maintaining behavioral gains following discharge.

The physician is usually the most powerful reinforcer on the team and must regularly observe, monitor, and reinforce the patient's progress. It is through his relationship with this physician that the patient learns how to relate to physicians without using "painful" or "sick" behaviors. One of the more important things a patient learns is that he can talk to physicians and other health-care professionals about positive things as well as about sickness, illness, and disability. The physician must carefully monitor the ongoing health of the patient, but with minimal attention. Intercurrent medical problems are followed and treated when it is appropriate with as little reinforcement of pain behavior as possible.

The Roles of Physical and Occupational Therapy

Both occupational and physical therapists use a graded program to increase the activity level of the patient, and the occupational therapist explores and encourages avocational interests. The patient generally attends both physical and occupational therapy twice a day and these therapists provide additional exercises and activities for the patient which are monitored by the nursing staff. The physical therapist generally chooses six to ten separate exercises, some of which may be done once a day, some twice, and some three times.

In both occupational and physical therapy, it is important that repetition levels start between 1/3 and 1/2 of the average baseline level on each exercise as determined during the evaluation week. During the evaluation week the patient will have done these exercises to tolerance and he will now be required to do them to selected criteria levels that begin very low and increase every day or every few days to the point where the patient is functioning at a normal level for each exercise. Both the beginning level and the rate of increase are chosen to ensure success by the patient throughout the program.

It is more important for the patient to succeed in doing an exercise each day than for the exercise to be increased to high levels at a fast rate. The most common error made by therapists is to set or raise criterion levels too high or too rapidly; therapists should be conservative whenever there is a question. The patient should succeed with the number of exercises that are requested so that he can receive a reward rather than experience a failure. Each day when the patient has reached his quota, the therapist provides rest, praise, attention, and other selected reinforcers.

If the patient does not meet his performance criterion for any particular exercise on any given day, the therapist ignores this and goes on to the next exercise. If the patient fails a particular exercise three days in a row, the criterion is dropped one level. If he still does not meet the criterion after it has been reduced for an additional three days in a row, the patient is discharged since we are not able to work with him. This has been written into the contingency contract and the patient is aware of this contingency. It is important that the therapist ignore failure and not coax the patient.

The Nursing Program

The nursing staff is actively involved with pain patients' medication and the activities assigned to be done at the nursing station. Since the patients in the Minnesota program are treated on the regular rehabilitation ward, there is a tendency for the nursing staff to ignore pain patients, especially when their activity levels increase. The patients cause few problems for the nursing staff, who may become involved in working with other patients and exclude those disabled by pain. Although the patients are to be ignored when they are complaining, it is often easy to continue to ignore them when they are not complaining. A major responsibility of all staff members is to provide daily positive reinforcement to pain patients.

Work Program

Every patient is provided a "work station" that is related to vocational planning during the fourth and fifth inpatient week. Work stations are jobs that the patient performs. These jobs are chosen to closely resemble the kinds of work the patient will be doing when he leaves the program. When appropriate, counseling psychologists and work evaluators are regularly involved with the patients. Vocational counseling with the pain patient focuses on teaching him to function at work in spite of pain, or perhaps even because of the pain. Time spent in a satisfying vocational pursuit is time spent not thinking about pain. Where paid employment is not an issue, avocational goals and plans are formulated.

Graphs and Charts

All exercises and activities required of the patient are graphed. These include regular exercises and activities, special prescribed activities such as increased sitting or standing time spent at the work station, etc. The patient carries all of his graphs on a clipboard throughout the day. These graphs are self-reinforcing; when the patient plots required data, he sees progress

immediately. The graphs also provide a basis for staff reinforcement. When a physician or other team member talks with the patient, he can look at the graphs and provide verbal reinforcement for an increasing activity level.

The Social Worker's Role

The social worker contributes to the rehabilitation team's diagnostic efforts, treatment plans, and goals. The details of these contributions have been described by Hudgens (21). Generally, the family members of chronic pain patients either enable pain behaviors or fail to reinforce well behaviors. The social worker helps the family change this reinforcement pattern. At first they work with the spouse and, where appropriate, other family members by having them practice identifying pain behaviors and writing them down. The social worker will help the spouse list all identifiable behaviors which communicate that the patient is experiencing pain. After the family makes this list of behaviors, the social worker asks them to practice observing them by counting these behaviors during a visit to the pain patient. Later the spouse and the social worker discuss these observations. After several visits the spouse is requested to observe his own behavior in the presence of the patient. The spouse looks at his responses, lists, and counts them. For example, he can record the number of times he rewards the patient with praise or the number of times he ignores a complaint of pain.

The social worker helps teach the spouse and others to behave appropriately by modeling and role playing how to ignore sick behavior and reward well behavior. The concept of enabling must be taught to family members. They need to learn that negative attention, fussing, nagging, etc. are forms of attention and may reinforce pain behaviors. Ignoring sick behavior is not enough; well behaviors must be attended to and reinforced.

Potential Risks

There are a number of potential risks that should be considered in treating pain patients behaviorally. The one of greatest concern to the physician is the possibility of overlooking organic pathology that might be exacerbated by a heavy exercise and activity program. The only way to deal with this issue is to make a careful medical examination of the patient both on an outpatient basis prior to admission and during the evaluation week of the program. This may be one of the few instances in which diagnostic workups that are overinclusive are justified. It is exceedingly important that the patient, his family, and the physician all be convinced that the program will not be harmful.

There is always a potential risk of injuries to the patient during treatment. While these are rare, patients do sprain an ankle, develop "march" fractures, or sustain other injuries as part of an increasing level of exercise and activity. Some patients are at risk for bone injury because of osteoporosis caused by prolonged bed rest, aging, or both. When these injuries occur, it is important

to continue the program within limits set by the injury and to treat the injury as routinely as possible. Patients receive no more and perhaps less attention than they would have if they had been injured outside of the hospital. Another risk that is often mentioned but to date has not been observed is the possibility that a very literal or concrete patient might, after learning to "ignore pain," ignore a symptom in the future instead of seeking evaluation and treatment. However, a properly managed treatment program teaches the patient to manage medical problems responsibly and not to ignore all pain.

These risks must all be weighed against the increasing disability from which the patient will suffer if he is not treated. As with any medical procedure, the risks must be carefully weighed against the potential gains and informed choices made by the patient and the physician.

GENERALIZING THE PROGRAM

Working with the families of pain patients is essential to ensure generalizing of newly learned nonpain behavior away from the inpatient treatment setting. If the patient returns home to the same setting with the same reinforcements for sick behavior, the learning he achieved during treatment will invariably deteriorate. The family is always taught to allow the patient to assume full responsibility for the management of his body, medical problems, and medications.

It is necessary to explain the program, its outcome, and the need for a different kind of patient-physician relationship to the referring or family physician in a way that will enhance understanding, cooperation, and support. Often health-care professionals have unwittingly reinforced the patient's pain behavior with high levels of caring, concern, and sympathy. Many physicians are unfamiliar with the behavioral model and they conceptualize their patient's problems in terms of disease process. It is difficult for physicians who have been treating a chronic pain patient for a long period of time to refrain from represcribing drugs when a patient asks for them following discharge. Sometimes a "contract" can be negotiated between the patient and his physician which defines their future relationship. For some patients it is helpful if the physician agrees to regular visits by the patient every few weeks contingent upon the patient not using pain or sickness as an excuse for these visits.

OUTCOMES

What Happens to the Pain?

One of the most frequently asked questions about behavior modification programs for chronic pain is, "What happens to the pain after treatment?"

Since pain is a subjective phenomenon, the only way to find out is to ask the patient. In the Minnesota program, patients are not asked about their pain at any time during treatment because this would focus the patients' attention on pain and reinforce verbal complaints about it, and because the stated purpose of the program is not to get rid of pain but instead to teach the patients how to live normal lives even though they might have pain.

Following treatment, many patients report that they hurt just as much as they did when they came into the program, some patients report they hurt less, and some patients report that they are pain free. Of those reporting that they hurt just as much as they did when they entered treatment, some report that they are pain free or significantly improved at six-month or later follow-up. Of those reporting pain when they left the program and improvement on follow-up, a significant proportion later say that they were pain free or improved when they were discharged from the program (20).

It is obvious that there are no consistencies. Not only the perception of pain is altered in some patients, but also the memory of pain. To the extent that pain is alleviated it would be difficult to determine whether the relief is attributable to the operant treatment approach; to the exercise program which itself might be expected to reduce pain in some patients; to the removal of drugs; or to some combination of these and other factors.

It must be emphasized that *if there is no pain behavior, there is no pain problem.* To use this approach to treat patients with pain it is necessary to learn to focus on what the patient does about pain and not on what patients say about it. Of the wide range of pain behaviors, verbal complaints of pain appear to be the most difficult to extinguish. Patients leaving the program may be functioning at fully normal levels for age and sex, having entered treatment totally or almost totally incapacitated, and still report that they have gained no benefits from treatment even though they have collected and graphed the data which contradict this feeling.

Evaluation of Outcomes

It is very difficult to evaluate the outcome of treatment procedures for pain or to compare results of different methods or treatment programs. Criteria for selecting patients and outcome measures vary widely. When outcomes are reported, it is difficult to identify specific as contrasted to general affects. Any outcome evaluation of pain treatment must control for the placebo effect (11) and expectancy (4). If both the patient and the physician believe that the treatment will be helpful, 1/3 of the patients will show excellent results and another 1/3 more modest results when the treatment is a placebo (5, 11). There appear to be no data to support the generally held view that the positive effects of placebos last only for short periods of time when the patient and the physician both believe the treatment to be specific and effective.

Only a few studies of patients treated in "pure" operant programs have been reported. Fordyce et al. (14) evaluated 36 patients treated in the Washington program. His patients showed large increases in activity level and large reductions in the use of medications. The gains were generally increased or maintained on follow-up.

Anderson et al. (2) and Hudgens (21) reported follow-up results from the Minnesota program. From their findings as well as continuing follow-up studies of patients who have been discharged from one to eight years, it appears that between 75 to 80% of the patients treated are leading fully normal lives without pain-related medications (26). An unknown number of the remaining patients are significantly improved when compared to their functional levels at the time of admission. Reports from treatment programs that are not purely operant are not as strong (18, 30, 31, 32). Little can be generalized from these few studies other than the encouraging possibilities of behavioral approaches.

FUTURE TRENDS AND NEEDS

The most pressing current need is for the development of more reliable ways of identifying potential chronic pain patients *before* surgery and before chemical dependence develops. The results of operant pain treatment programs coupled with evaluation of the literature on less conservative procedures already suggests that many of the treatments for pain, including some surgical procedures and electrical stimulators, operate at no greater than the placebo level of success (see, for example, 24, 25).

Prevention programs should be developed for high-risk patients who might be identified through workman's compensation and third-party carriers, physicians, lawyers, or others. These patients would be placed in short, in-hospital operant chronicity prevention programs that would include exercise and activity; patient, spouse, and family members education by means of lectures, group discussions, videotapes, and films; direct contact with the patient's attorney and primary physician when applicable; and rapid return to work or other normal activity with appropriate reinforcements. The optimum use of this type of prevention program would require systems changes of great complexity. These would include the education of physicians and other health-care professionals, changes in health-care-delivery attitudes, significant changes in the workman's compensation system, changes in the legal system, and the education of employers and unions, all of whom may unknowingly and inadvertently be involved in supporting the development of chronicity.

Perhaps the single most needed systems change and the one most difficult to accomplish is to change the prevailing attitude of our society that all

discomfort must be alleviated by either excising it (as with surgery or psychotherapy) or covering it up (as with analgesic or psychoactive medication). Unfortunately, this attitude is supported by powerful professional, legal, and economic interests that are themselves reinforcing. Changes, if they occur, will take time and are likely only if sufficient data are developed to demonstrate convincingly that pain will respond reliably to behavioral treatment if the treatment is initiated early and correctly applied.

There is a need for controlled outcome studies comparing operant treatment programs with mixed or alternative psychotherapeutic approaches, as well as surgery and other disease model interventions. There are noticeable trends toward the increasing use of operant and other behavioral approaches to treating chronic pain and, based on the experience of the Minnesota program and others, there is some trend toward extending outcome goals for all chronic pain patients. Perhaps one of the more favorable trends is an increase in the consideration of behavioral approaches before disease model approaches even when organic pathology has been identified (9).

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The Comprehensive Handbook of Behavioral Medicine, Volume 2

CHAPTER 10

A Model for Inpatient Liaison-Consultation With Chronic Pain Patients

Michael J. Corley
Steven Zlutnick

INTRODUCTION

During recent years consultation-liaison psychiatry has become an important psychiatric subspecialty. Traditionally, consultation has involved a direct intervention with a patient at the request of another service; liaison involves the training and education of another service's personnel to better manage its own patients. Since the distinction is frequently blurred in actual clinical practice, we will refer to all our activities as occurring in the context of consultation-liaison.

In this chapter, we present a model for an inpatient behaviorally oriented consultation-liaison service for chronic pain patients. This service has been developed over the past five years at the Division of Behavioral Medicine in the Department of Psychiatry at the University of Utah Medical Center. Its goal has been to develop a practical and efficient clinical management program for patients with chronic pain.

Chronic Pain as a Clinical Problem

Pilling, Bronnick, and Swensen (11) reported that patients referred with a diagnosis of chronic pain of unknown etiology, e.g., psychogenic pain, psychosomatic pain, pain with psychogenic overlay, etc., accounted for nearly one-third of the referrals to a psychiatric consultation service. Black (2) further characterized these patients as suffering from intractable pain for at least six months. They frequently have multiple pain complaints, which are

inappropriate or out of proportion to existing somatic problems, and their use of medical facilities is characterized by "poly-surgery, poly-addiction, and poly medicine," as they search for effective relief of their pain. Often frustrated, angry, manipulative, and noncompliant, these patients represent a difficult management problem for clinical medicine and engender anger and frustration in the health professionals involved in their care. A consultation request for psychiatric assessment often occurs when the latest in a series of surgical and medical evaluations has proved fruitless.

Since every step in the referral process is important in determining the outcome of the consultation-liaison, we will begin with a general discussion of clinical issues relevant to this process before discussing the specifics of how we manage chronic pain problems. Table 1 represents a schema of the consultation-liaison process we use.

THE REFERRAL

Our work begins when we receive the referral. The first step is to contact the medical staff to determine exactly why the referral was made and what the physician expects. The referral process involves a series of decisions and behaviors by the referring physician: his decision to refer, the specific reason for the referral, what the patient is told about the referral, and what the physician expects from the pain clinic. An accurate assessment of each of these decisions is critical for successful resolution of the referred problem. At the referral stage, "good clinical skills" are a prerequisite for successful intervention.

Reasons for Referral

Nonpsychiatric medical services refer patients for a variety of reasons which may not be indicated on the referral form. It is important to determine why the referral was actually made and what the referring service expects. In our experience, the physician often decides to refer patients when: 1) the amount of the patient's pain seems disproportionate to pathology, if any; 2)

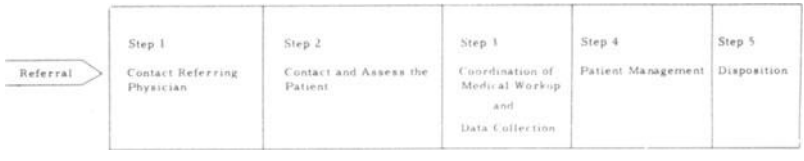

Table 1. Steps in Consultation-Liaison process with chronic pain patients on non-psychiatric wards.

the patient is addicted either physically or psychologically to analgesic or sedative/hypnotic medication; 3) he suspects that the pain is somehow not real, e.g., "in the patient's head," and 4) he is experiencing an impasse with the patient related to these and other issues. For the first three issues, physicians expect the consultant to determine or "diagnose" whether or not the pain is "real." Although initially this may appear to be a logical request, our experience and that of other investigators with chronic pain patients is that the issue of "real" vs. "psychogenic" pain is irrelevant and counter-therapeutic. The reasons for this are as follows: First, it is impossible to determine if a patient is *really* experiencing pain. Pain is a subjective experience and we are dependent on the patient's report as the only measure of its presence and intensity. Physicians often confuse their inference about the existence of pain, based on their identification of pathology or whether the patient "seems to be in pain," with the patient's self-reported subjective response. To attempt to force this distinction between real and psychogenic pain frequently hinders, rather than enhances, a successful therapeutic outcome, since this process threatens the patient's integrity and often accounts for the overwhelming resistance met by physicians when they attempt to refer their patients to a psychiatric service. An attempt at making this distinction is often seen by the patient as a message from the physician: "Your pain is in your head, not real. Your suffering is not real. You are malingering." It is imperative that referring physicians understand the futility and the potential harmfulness of forcing such distinctions.

Second, we re-emphasize to the referring physician that we can be most helpful in *managing* rather than diagnosing pain. We request that the physician ask our help in managing the patient whenever he feels that pharmacological or surgical interventions are ineffective, inappropriate, unnecessary, or even harmful. The time spent in educating referring physicians has resulted in our early inclusion in the workup and management of many chronic pain patients.

How the Referral is Made

The manner in which the physician makes the referral to his patient is most important. A number of problems arise at this critical juncture which, depending upon how they are managed, may hinder or facilitate the process. The physician should communicate *clearly* to the patient that he believes the pain to be real and that the lack of diagnosis in no way reflects on the system's ability to alleviate the pain: for example, surgery, new analgesics, etc. are not the best solution. A corollary to this rule is that patients need to be given a rationale for their pain in the absence of disease. This issue is often most responsbile for lack of compliance with referrals and subsequently responsible for "doctor shopping." To bypass this issue we explain to the patient that there are many times when pain occurs in the absence of disease,

e.g., headaches and stomach aches. Most people have experienced this kind of discomfort and they are able to appreciate and accept this analogy; few would expect a neurological examination to uncover brain disease when they have a headache.

Two additional factors contributing to the failure to comply with a psychiatric referral are the following: 1) Because he cannot satisfactorily resolve the problem, the physician is often frustrated with, and frequently angry at the patient. As a result, the referral is often made in accusatory fashion, implying to the patient that the problem is the his and could be easily resolved if only he would face his underlying psychological problems. 2) Implicit in this process is a message to the patient that now that the problem is clearly psychological, the physician can wash his hands of the case and move on to those who truly need his help. Both of these issues can be resolved if the physician keeps two thoughts in mind: First, that these patients are frustrating and his translation of this frustration into anger at the patient will produce defensiveness and not compliance. Compliance is based in part on trust and mutual respect. An honest admission by the physician that a particular case is outside his field of expertise and that others can be more helpful to the patient will go far in producing the desired cooperation. Second, the patient should be reassured that this referral does not mean a termination of the treatment relationship between him and his physician, which is often the case. As Pilowsky (12) warns, "The psychiatric consultant may find his non-psychiatric colleagues only too eager to accept the idea that psychological factors explain the patient's pain entirely." The physician should indicate that he will monitor the patient's progress throughout treatment and continue to maintain contact with the patient. Frequently, a psychiatric referral is correctly interpreted by the patient to mean "goodbye and good riddance."

The physician is often insensitive to his own feelings about psychiatry. If he feels a psychiatric referral is not going to be successful, and that it is a means by which he can rid himself of a troublesome patient, he will undoubtedly communicate these feelings to the patient. Unfortunately, his stereotype may be correct, since many mental-health professionals are not trained to deal with these patients and traditional psychotherapeutic techniques have been generally unsuccessful with this difficult population. This problem can be resolved if the physician can become familiar with treatment programs for chronic pain to which he can refer patients with confidence.

We complete the first step of the consultation process by consulting with other medical staff about these issues. Although the emphasis in this discussion has been on liaison with the physician, the problems and solutions presented apply to all medical personnel involved with the patient.

INTRODUCTION OF THE LIAISON-CONSULTANT

A common first experience with a psychiatric liaison-consultant is with a patient who, believing his problem to be medical, suddenly finds himself face to face with a psychiatrist or other mental-health professional. The response is almost always one of an extremely defensive posture. This problem can be avoided in a number of ways. When a consultation request is received, the liaison-consultant should immediately contact the referring physician to confirm that the pain clinic referral has been thoroughly explained to the patient. Without this step, consultations have an extremely high probability of an unsatisfactory outcome. The liaison-consultant reaffirms this with the patient at the initial contact. At this time, the consultant should identify himself, make sure that the patient understands the nature of the consultation, and that the purpose is to explore additional procedures for the relief of pain, *not* the resolution of deep-seated psychological causes of the pain. Similar discussions should be planned with family members or significant others, since resistance to pain clinic/psychiatry referrals is often related to their lack of understanding of the process. By combining these procedures, resistance to referral decreases considerably.

THE MEDICAL WORKUP AND THE ROLE OF THE LIAISON-CONSULTANT

The manner in which the pain clinic liaison-consultant becomes involved with a medical workup on another service is one of the most sensitive and critical issues in the liaison-consultation process. Because pain patients are frequently manipulative, and at the same time, the medical staff has a "let's get rid of this guy" attitude, it is crucial that the patient know who is in charge of his overall workup. In our pain service, the referring physician is in charge until the patient is formally transferred to the pain clinic. It is important that this physician explain the progress of the workup and the interpretation of various findings to the patient. Special attention should be given to the explanation of negative findings or of static pathology.

At this stage, the role of the liaison-consultant should be that of patient advocate. This includes insuring that the patient has all of his questions answered about the workup process. A common patient manipulation at this point is to ask different staff members the same questions. Often, even in a well-coordinated treatment program, the patient will receive slightly different interpretations of a test result or different reasons for the choice of medications. He may then use this disparity to manipulate the staff. One of

the services the liaison-consultant can provide is a consistent way for the patient's questions to be answered by members of the treatment team. This stage of the intervention process requires more time than any other, since frequent visits to the ward are the only way to effectively monitor and quickly alleviate crises generated by mixed communications to the patient. It is not uncommon to make rounds or respond to staff requests three to six times per day in addition to answering numerous phone calls from the ward. This necessitates the scheduling of pain clinic staff so that one person is always relatively free to respond. Although the logistics of this intervention phase may be difficult to manage, it seldom is more than a day or two before the patient and the staff have adapted to the new treatment program.

DATA COLLECTION

The chronic pain patient has often seen a consulting psychiatrist or had one recommended. The behavioral consultation is usually different, with a strong emphasis on data collection designed to *measure* the patient's problem, i.e., the presence and intensity of chronic pain. Collected pain data provide a basis for assessing and planning treatment strategies. The key to this evaluation system is a self-report, hourly pain diary, called the Pain Evaluation Data System, or PEDS (19). Figure 1 shows a sample diary sheet for one 24-hour period completed by a patient in the hospital. Hours of the day extend along the extreme lefthand column; the next three columns reflect his activity level, the type of activity, and the amount of time spent in that activity. The medication column allows the therapist to evaluate on an hourly basis the effects of medication on pain and mood. The remaining two columns provide the quantifiable subjective ratings by the patient on his pain and mood which are rated on a scale of 0 to 5. For pain, 0 indicates complete absence or pain and 5 generally is described as "if you had this pain for more than fifteen minutes, it would be absolutely unbearable." For mood, 0 indicates a very depressed mood while 5 represents a very good or high mood. All of the columns, except medication, may be summed and averaged to provide daily scores for activity, pain, and mood. Similar data systems have been previously described by Sternbach (13) and Fordyce (5).

The PEDS system allows us to evaluate a number of variables. A comprehensive description of the patient's pain relative to time, type of activity, mood, and medication emerges from the data. For example, relative to time, we observe whether changes in pain intensity and mood occur at any regular time during the day. Relative to activity, we see the extent and type of the patient's activity, and the pattern of his activity. This allows the staff to assess whether certain activities are associated with more pain than others.

NAME: _____ DATE: _____

HOUR BEGINNING	SITTING		WALKING OR STANDING		RECLINING		MEDICATIONS		PAIN (absence 0 · 1 2 3 · 4 5 unbearable)	MOOD (low 0 · 1 2 3 4 · 5 high)
	MAJOR ACTIVITY	TIME	MAJOR ACTIVITY	TIME	ACTIVITY	TIME	TYPE	AMOUNT		
12:00am					SLEEP	60				
1:00					SLEEP	60				
2:00					SLEEP	60				
3:00					SLEEP	60				
4:00			BATHROOM	10	REST	50	DEMEROL	100mg	X	X
5:00					SLEEP	60				
6:00					SLEEP	60				
7:00			BATHROOM	10	REST	50			X	X
8:00	BREAKFAST	30	SHOWER	15	REST	15	DEMEROL	100mg	X	X
9:00	MADE READY FOR X-RAY	30	GOING TO X-RAY	30					X	X
10:00	WAITING FOR X-RAY	30			X-RAY	30			X	X
11:00	WAITING FOR PAIN SHOT	30	WALKING TO ROOM	15	X-RAY	15			X	X
12:00noon					REST	60	DEMEROL	100mg	X	X
1:00	LUNCH	30			REST	30			X	X
2:00	WRITING LETTERS	45	WALKING TO GIFT SHOP	15					X	X
3:00			GIFT SHOP	15	REST	45	TYLENOL #4	1	X	X
4:00					READING	60			X	X
5:00	HEARD OF TEST RESULTS from Dr.	30			REST	30			X	X
6:00	DINNER	30			T.V.	90			X	X
7:00	VISIT WITH FAMILY	60							X	X
8:00					T.V.	60			X	X
9:00					T.V.	60			X	X
10:00			BATHROOM	10	T.V.	50	DEMEROL	100mg	X	X
11:00					REST	60			X	X

Fig. 1. PEDS data sheet completed by a patient during the workup process.

Relationships between medication, activity, pain, and mood may also become obvious; for example, does the patient change his activity or pain ratings following the administration of pain medication. Relative to mood, we learn the extent of the patient's range of mood, as well as the relationship between pain, mood, and environmental factors—for example, individuals in his environment whose visits are followed by increased pain or transient situational depression. How well the patient fills out the form is also a useful indication of compliance.

For example, from the data sheet presented in Figure 1, the consultant would calculate the following data for the day: The average pain rating was 4.44, the average mood rating 0.88; the patient spent 5.25 hours sitting, 2 hours walking or standing, and 16.75 hours reclining. After examining the ratings on an hourly basis, he could conclude that the patient's pain ratings appear to be insensitive to both level of activity and pain medications. This type of analysis provides data that may be plotted during the course of the workup process. Being involved in the collection of data during the workup process is probably a novel experience for the patient, the nursing staff, and the attending physicians. It should be explained to the patient that filling out the daily diary sheets is just as important as having skull x-rays. As a bonus, it

is not uncommon for patients to achieve useful insights into their pain problems as they fill out the sheet.

Figure 2 is a sample of the plotted data for a patient's average pain and mood levels. Activity data, the amount of time the patient spent reclining, sitting, or standing and walking in each 24-hour period, could be plotted in a similar fashion. After baseline data is gathered, any procedure or therapy may be introduced at a particular point and its effect evaluated by looking for changes against baseline for any of the dimensions covered on the PEDS. Although the range of the patient's activities is usually restricted in the hospital setting, multiple tests and diagnostic procedures provide him with a variety of experiences. In order to increase the range of measured activity, patients should be instructed to not spend all of their time in bed between tests and to be up and round, visit with people, and attempt to socialize and walk around the hospital.

Other data may be collected by using the SORKC model presented by Kanfer and Phillips (7). SORKC provides an assessment of possible stimulus control relationships for pain behaviors and defines the pain behaviors, biological variables, and consequences of the pain behavior. In their evaluation procedures, it is quite important to have a thorough interview with the patient and a significant other person. The interview is to assess the effects of the patient's pain problem on the patient's life style.

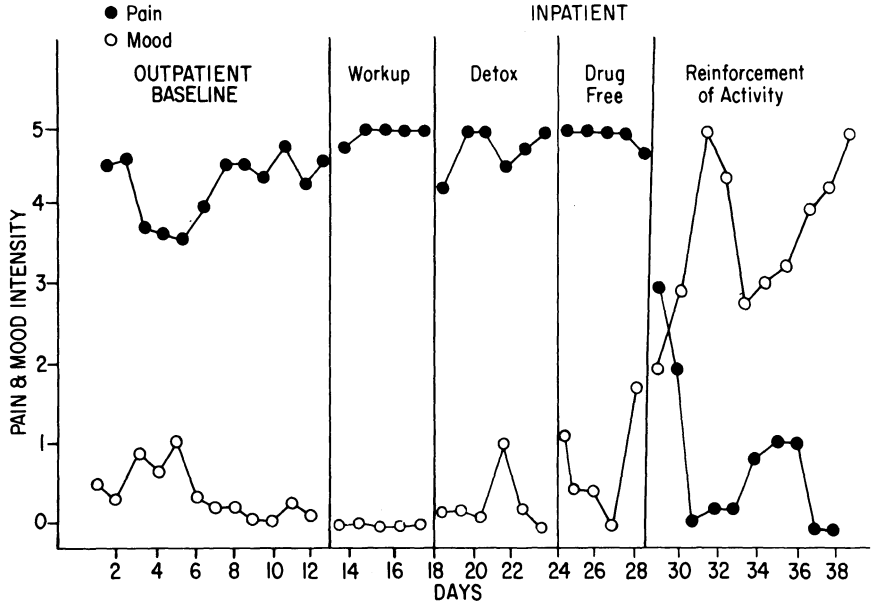

Fig. 2. Pain and mood self-ratings of a chronic pain patient during workup, detoxification and treatment.

Fordyce (5) listed the following issues to be determined during a behavioral analysis of pain behaviors:

A. What activities precede pain behaviors?
   1. When does pain occur?
   2. What are the nocturnal time patterns for the pain problem?
   3. What are the diurnal time patterns for the pain problem?
B. Define the patient's pain behaviors
C. Environmental responses to pain behavior.
   1. What are the sources of direct reinforcement of pain behavior?
   2. What are the sources of reinforcement of inactivity?
D. What activity or conditions tend to increase the patient's pain?
   1. List of activities that increase pain.
   2. How soon and to what degree does pain begin following each activity listed?
E. What activity or conditions tend to decrease pain?
   1. Is rest a pain diminisher?
   2. Is medication a pain diminisher?
      a) How much medication is taken per day?
      b) What is the patient usually doing just before taking pain medication?
      c) What determines whether medication is requested?
F. Does tension increase pain and does relaxation decrease pain?
   1. How does he know when he is tense?
   2. What activities appear to make him tense?
G. What changes have occurred in the patient's life style as a result of the pain problem?
   1. What modifications have occurred in activity level?
   2. What would the patient be doing if he had complete relief from the pain problem?
   3. What modifications have occurred in the patient's significant relationships?
      a) Has there been a change in the activity pattern of any significant other since the patient developed the pain problem?
      b) Has there been any change in the degree of social or sexual contact with significant others?

In addition to obtaining this detailed pain history, depression and organicity should be specifically evaluated. Moruta and Swanson (10) have observed that these patients may be chronically depressed and attribute their depression to their chronic pain problem. It may be impossible without further evaluation to determine whether depressive symptoms, such as changes in sleeping patterns, lack of interest in sex, decreased interest in social activities, lack of appetite, etc., are reactive to the patient's pain problem or a result of a biological depression. The potential effectiveness of antidepressants can be evaluated with a clinical trial of medication. In contrast with other investigators (6), we use antidepressant medications only

after the evaluation of mood *following* detoxification (16), since mood frequently improves after withdrawal from chronically prescribed medications.

The traditional mental status test (14) of the Wechsler Adult Intelligence Scale (WAIS) may provide information about intellectual decline. This testing often provides valuable clinical data about patients who have unrealistic complaints of pain and show intellectual deterioration. Fordyce (5) points out that elderly patients who have vague but persistent long-standing pain complaints sometimes have significant cortical deficits, such as early arteriosclerosis, that impair memory or perception. For some of these individuals, pain complaints allow them to escape participation in those daily activities that could reveal their memory or perceptual deficits and cause them distress. Evidence or suspicion of intellectual deterioration should be followed by a prompt neurological workup. Depending on the degree of deterioration, the patient's family will also be in need of counseling to know how to respond to the patient's pain complaints.

Strain and Grossman (14) point out that the observations of the patient by the nursing staff can be used to corroborate the physician's clinical assessment. A thorough examination of the patient's previous hospital records often provides useful information, e.g., has the patient's pain complaint been consistent across time? It may also be useful to contact the patient's pharmacist to obtain information about possible medication abuse. A monthly medication bill for pain relievers is often far more reliable than subjective report of medication use. Phone calls to physicians who have treated the patient in the past may provide valuable information about the patient's health-care and medication-use patterns that is not recorded in the medical chart.

While gathering this clinical data base, daily notes should be placed in the patient's chart to facilitate communication with other staff members. Notes should be written as objectively as possible in the problem-oriented manner outlined by Weed (17), without psychiatric jargon. Rather than writing "the patient seems to be doing a little better," the note might read "her pain ratings have dropped from 3.0 to 2.0 and her mood is up from 3.0 to 4.0." The initial description of each clinical problem should include *Subjective* data, *Objective* data, *Assessment* of both the subjective and objective data pertaining to that clinical problem, and *Plans* for solution, i.e., a SOAP note (1).

PATIENT MANAGEMENT

One of the major contributions of the liaison-consultant is to provide strategies for patient management during the workup process. Patients leave the hospital against medical advice for a variety of reasons, including fear,

manipulativeness, anger, etc., and the staff need to be aware that under other conditions the patient may be ready to receive the help he needs. If the patient chooses to leave before completion of the workup, it is important that clear communication to be made with the family or the friends of the patient as to why the patient chose to terminate the workup. The progress to that point should be outlined for the family and the patient. It should also be made clear that there are no feelings of anger or animosity on the part of staff toward the patient and that whenever he wishes to return to the hospital and a treatment contract, the workup can be completed.

If there is a great deal of conflict between the patient and the nursing staff, the consultant may have to negotiate behavioral contracts between nursing staff and patient to help ensure that the patient's workup proceeds in a peaceful, cooperative climate. The model for this type of contract, presented by Sternbach (13), includes the patient's treatment goals and his obligations toward achieving these goals, the staff's obligation to the patient, and the treatments to be utilized in achieving these goals.

Nursing staff may initially be hesitant to contribute the time to help design such a treatment program during the early stages of the workup. If the consultant is successful, the nursing staff will usually be able to observe that the patient makes fewer demands on their time once a contract is planned and carried out, rather than when patient care is the result of moment-to-moment crisis intervention. One example of a possible source of patient-staff conflict is multiple requests for pain medications. A great deal of time may be saved by having all of the staff respond to the patient's requests in a consistent manner. Other common problems include attempts to manipulate the staff with various pain behaviors and displays of hostility toward staff members. Since the nursing staff are in a position to observe the patient much more than the attending physician, an interview with the nursing staff will usually help pinpoint specific patient behaviors that are counterproductive to the workup process. Berni and Fordyce (1) provide a framework for defining and monitoring these behaviors. They point out that many goals of the nursing staff may not be expressed in a behavioral manner: e.g., improving compliance, gaining weight, and reducing fear. As part of the behavioral liaison-consultation, the nursing staff might instead be trained to pursue clinical goals such as participating in a postoperative exercise program, increasing food intake, and decreasing avoidance responses in the hospital setting. When clinical goals are stated in behavioral terms it is easier to develop a workable contract which includes the nursing staff.

Management of Pain Medications

The patient's use of analgesic medications requires more rigorous attention than any other single issue. Not only do these drugs eventually produce a

paradoxical effect on the patient's pain symptoms, but they also lead to a number of management problems to be faced by the health-care system, including many of the following examples: a continuing escalation of demands for larger doses of analgesics, often manifested by numerous calls to the physician at home and at the office, frequent nighttime visits to the emergency room for IM medications, and emotional demands for medications on the medical service on which they are hospitalized for evaluation.

The solution to this problem is straightforward: Only one physician should be in charge of the patient's pain medications. This will enormously decrease the manipulations engaged in by patients to obtain medications. Halpern (6) illustrates the problem of medication abuse with a table that presents the 24 medication orders of a woman under the care of seven physicians simultaneously. Although this case is an extreme example, it illustrates the medication management problem posed by patients with chronic pain.

The staff should be aware that patients frequently under-report the amount of pain medication taken prior to entering the hospital and may experience drug withdrawal during the early days of the workup. Our experience has shown that chronic drug abusers frequently have a mild acute brain syndrome from their large amounts of medications, and their ability to objectively report subjective as well as objective and historical data becomes grossly impaired. The "clearing" symptoms in many patients after detoxification lend strong support to this formulation (16). Another issue that must be appreciated by staff is the patient's firm belief that without pain medication, his life would be unbearable. It is important that the patient not be discharged with the incorrect assumption that he will need to remain on analgesic medications for the rest of his life. A similar message should be communicated to his significant others.

Special caution should also be taken with those patients who have been using large amounts of barbiturates. Halpern (6) provides figures that show that 10% of the patients taking 500 mg of pentobarbitol per day have seizures or psychotic episodes when withdrawal is abrupt, and 90% of patients consuming over 900 mg will have withdrawal seizures. Although not as critical medically, it is important that analgesics be provided for the patient at baseline amounts during the early part of an outpatient workup if the patient is to be kept comfortable. Still another variable to be considered is the paradoxical effect of analgesic medications on pain. Fordyce (5) has suggested that when pain medications are prescribed *prn,* they may act as positive reinforcers (4), and he suggests prescribing all medications on a fixed-time schedule basis. In this system, patient complaints are independent of the reinforcement effects of the drug, while the patient is allowed the same degree of pain medication he was receiving prior to entering the hospital (16). Finally, as long as patients are taking a great deal of pain medication, they

tend to have little motivation for learning pain control techniques such as relaxation training and self-hypnosis. This learning is further hindered by the presence of a drug-induced organic brain syndrome. For these reasons, it is usually not a productive investment of time to try to teach these techniques during the patient's workup while they are still medicated.

DISPOSITION

At the end of the consultation process there are usually two groups who await the judgment of the liaison-consultant: the referring physician and his staff, and the patient and his significant others. In discussing findings with the referring physician, data should be presented which are relevant to the clinical problem without psychiatric jargon or diagnoses.

At the end of an expensive and time-consuming medical workup that has produced negative results or results that do not meet patient expectations, many patients and their families respond to the diagnostic team with great hostility. It is important that the entire staff be consistent in communicating to the patient and family that they do not believe that "the pain is all in your head." There is danger at this point that the discouraged patient will leave the hospital and discover a new physician who will repeat the medical workup. The patient and the staff should be presented with the accumulated data on the relationships between and activity, situation, mood, and medications. It is useful to stress what clinical considerations may be ruled out at this point and to present the patient with an alternative to the disease model of pain. The patient should be reinforced for persevering in his efforts to seek help for this long-term problem.

When the referring physician has determined that his patient is a candidate for the Pain Clinic and the patient agrees, a request for immediate transfer to the Psychiatric Nursing Unit usually follows promptly. Our experience has shown this to be generally disastrous. Even when the patient accepts the referral, a number of issues need to be resolved before treatment can be initiated. These include detoxification, which is a frightening prospect for many of these patients (16), adjustment to the novel routine of a psychiatric ward, etc. Without proper patient education about these issues, a rapid transition from a medicine ward to a psychiatry unit is unworkable. Our policy has been to discharge the patient from the hospital and process him as a new patient through the Pain Clinic. Since we have inaugurated this policy, patient compliance has increased considerably. Patients must continue to record data on their activities, pain and mood levels, and medication use between admissions. We provide them with two to three weeks of pain diary sheets and arrange an appointment time *prior* to discharge. We reemphasize to the patient and his physician that the referring physician will remain in

charge of the case until the patient is actually seen by us in the clinic. At the same time, we reassure the physician that we will be available for consultations at any time during this transition phase.

MISCELLANEOUS ISSUES IN LIAISON-CONSULTATION

We have discovered a number of important issues in the liaison-consultation process that have been discussed previously by others (9, 14).

The Use of Nonpsychiatrist Liaison-Consultants

Individuals from many disciplines work together to treat and research chronic pain. Our experience has shown that concern over non-M.D. status is usually excessive. Most physicians are primarily interested in a successful resolution of the problem and have little difficulty accepting other professionals, *provided that they produce results.* We routinely take the time to introduce our nonpsychiatrist colleagues to our physician referral sources and indicate that their participation will in no way replace competent medical coverage.

Establishing Working, Interdisciplinary Relationships

A new chronic pain clinic will always be met with resistance and skepticism. Our solution to this problem has been to arrange a meeting among various referral sources on different services for the purpose of explaining our program, during which we discuss the types of patients we are willing to see, define our role in the treatment process, and provide a trial period during which the referring physician can evaluate for himself what we can or cannot do for his patients. Frequently, the physician initially refers his most difficult patients. Although this places a great deal of stress on the pain clinic staff, we remain convinced that it is the appropriate way to establish credibility; a few successes with difficult patients ensures a lasting, productive relationship between services. Usually the problem is overstated since our treatment procedures are most effective for the type of pain patients most physicians have difficulty managing.

Another frequently overlooked interdisciplinary issue is contact with nonphysicians on the medical service. Formal introductions and discussions are as critical with them as with the referring physician. Although the latter usually writes the medical orders, it is the nursing personnel who spend the most time with the patient.

Conflicts with Psychiatry Liaison-Consultation-Services

It is important to discuss the operation of the pain clinic liaison-consultations with the corresponding service in psychiatry. We have experienced no difficulty in this respect, since they often find the chronic pain patient as difficult to treat as the referring physician. Similarly, we are frequently called to see patients who, upon examination, are clearly psychiatric problems, e.g., biological depression, Briquett's Syndrome, and schizophrenia, and refer them to the psychiatry consultation service.

SUMMARY AND CONCLUSIONS

Although a major concern of this chapter has been the evaluation of patients with the chronic pain syndrome, many of the procedures described are useful for other types of inpatient behavioral medicine consultations as well. Whether patients have headaches during renal dialysis, chest pains long after a myocardial infarction, chronic abdominal pain without an apparent physical cause, inability to retain food following eating and chronic nausea, frequent seizures for which a neurological cause cannot be found, or chronic functional diarrhea, quantitative measures, such as self-report of their symptom complex with mood, activity levels, and medication usage recorded in diary form, will help the treatment team design a treatment program. Their data provide a useful baseline from which to measure the effect of treatment and to help the staff define problems.

In conclusion, our experience during the past three years has taught us a great deal about liaison-consultation for chronic pain patients in a university teaching hospital. Although we describe a smoothly operating model, it has taken countless hours over these years of trial-and-error experimentation to refine it to the present stage of development. Establishing this type of service is not easy, and the short-term rewards are at times difficult if not impossible to identify. However, the long-term payoffs more than compensate for the drudgery involved. We now provide an effective, efficient service for patients who have had nowhere to turn, and have developed effective and enjoyable relationships with colleagues in other specialty areas.

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The Comprehensive Handbook of Behavioral Medicine, Volume 2

CHAPTER 11
Behavioral Treatment of Migraine Headaches

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INTRODUCTION

Migraine headache is a vascular condition characterized by episodic and severe pain, usually occurring on one side of the head. The headache is often preceded by a variety of prodromal symptoms, such as scotoma, photosensitivity, or other sensory/motor disturbances. There is considerable variability in headache symptoms among migraine patients; for example, many patients do not report prodromal symptoms. Head pain reports of different patients may vary in intensity, frequency, and duration of pain, and a wide variety of environmental events may precede the occurrence of the headache. Many migraine sufferers report headache pain during a period of relaxation following a prolonged period of stress, while others report headache pain only infrequently during periods of relaxation, but episodes of headache pain with anger or exposure to aversive stimuli. Despite these individual differences, a clearly defined clinical syndrome has been established and a number of different procedures have been used for treatment.

The focus of this chapter will be to describe the clinical symptomatology and pathophysiology of the migraine syndrome and to present possible theoretical explanations for the development and maintenance of migraine headaches. Behavioral assessment and treatment strategies which have received experimental evaluation will also be reviewed.

Clinical Symptomatology

Several subcategories of vascular headache of the migraine type have been described. The subclassifications include: Classic migraine, common

migraine, cluster headache, hemiplegic headache, opthalmoplegic headache, and lower-half headache (4). These various types of migraine headache are usually distinguished by the presence of certain prodromal symptoms, or by differences in the duration or frequency of reported pain. However, the pathophysiology of all migraine variants is thought to be similar, if not identical, across the subclassifications. Thus, the term *migraine syndrome* will be used to describe this general class of vascular headaches and no attempt will be made to distinguish among the types.

The migraine syndrome is primarily characterized by periodic, severe head pain, usually localized on one side of the head, near the eye or the temple, or in the occipital area. In rare cases, the pain may be felt in the face or neck. Although it is typically unilateral at onset, the pain may spread to a more generalized area over time. Usually, the pain is described as throbbing or pulsating, and quite often the headache is accompanied by anorexia, nausea, vomiting, and sometimes constipation or diarrhea. In some cases, this headache phase is preceded by prodromal symptoms. Although preheadache phenomena vary considerably among individuals, most migraine sufferers with prodromal symptoms can describe a consistent pattern of preheadache phenomena. The most frequently reported prodromes include: Blind spots or scotomata, flashing lights and other visual disturbances, pareatheseas of the face and hand, vertigo, syncope, sweating, and nausea. In the days just prior to a headache, many patients report generalized edema, fluid retention, and weight gain. During the headache phase, local edema around the affected area has been documented. After the headache phase, patients report a wide variety of symptoms. These range from a feeling of well-being to depression and a general tenderness of the head area that had been painful.

Pathophysiology of the Migraine Syndrome

From the research of Wolff (24) and his associates (4), three phases of the migraine syndrome have been identified. These are the preheadache, headache, and postheadache phases, each of which produces rather distinctive changes in cranial arterial vasoconstriction and vasodilation. The preheadache or prodromal symptoms are apparently the result of intracranial vasoconstriction. For example, scotomata are thought to result from ischemia of the posterior cerebral arteries. The cerebral ischemia reduces the blood supply of specific brain areas, such as the occipital cortex, and produces these unusual sensory phenomena.

The headache phase primarily results from extracranial vasodilation and increased pulsation of the extracranial arteries. In particular, branches of the external and internal carotid arteries appear to be most commonly implicated in the production of migraine head pain. Wolff and his colleagues (4, 24) have demonstrated that artificial stimulation of the superficial temporal artery and

the occipital artery can produce head pain in the temple and occipital regions of the head, and stimulation of the supraorbital and frontal arteries, which are branches of the internal carotid artery, can produce head pain in the area of the eye and forehead. Recordings of the vasomotor changes of the temporal artery during the three phases of the migraine syndrome also indicate that extreme vasodilation of the extracranial arteries reliably accompanies migraine head pain. Although there is evidence indicating that dilation of the intracranial arteries occurs during this headache phase, intracranial vasodilation is not thought to be implicated in the production of pain (4). On a biochemical level, the release of platelet serotonin, a vasoconstrictive agent, has been implicated as the immediate cause of cranial vasoconstriction during the prodromal phase, and depletion of serotonin is thought to produce the vasodilation during the headache phase (1, 4). In addition, proteases and polypeptides are liberated during the headache phase, causing local edema and a reduction in pain threshold (4). Following the headache phase, these vasomotor and biochemical changes return to "normal" levels and there is a cessation of head pain. In some cases local edema and some tenderness may persist for a day or more.

Theoretical Perspectives

Clinical observations and field research studies (1, 4) suggest that a wide variety of enviornmental, behavioral, and physiological events may precipitate a migraine headache. The precipitating events include environmental stress, sleep loss, exhaustion, menses, oral contraceptives, certain foods, and alcohol. Wolff (24) has hypothesized that the common element in all of these factors is the interruption of a continuous, abundant supply of blood, rich in oxygen and glucose and low in CO_2 to the brain. Wolff's neurogenic theory of migraine headaches states that certain individuals are genetically predisposed to the occurrence of the extreme vasospasms associated with the migraine syndrome. For these individuals, any event affecting the central or peripheral neurovascular control mechanisms and leading to a decrease in blood supply to the brain should produce the vasodilation and biochemical changes of the migraine attack. Although certain elements of this theory are either without direct support or have not yet been adequately documented, Wolff's theory does account for most of the available data better than other theoretical conceptions.

From the viewpoint of behavioral assessment and treatment, Wolff's theory is not entirely satisfactory. In particular, he has not identified the environmental antecedent and consequent or other behavioral factors which may be implicated in the development and maintenance of migraine activity. Figure 1 summarizes a theoretical model we have developed which outlines the possible relationship between the physiological, behavioral/environ-

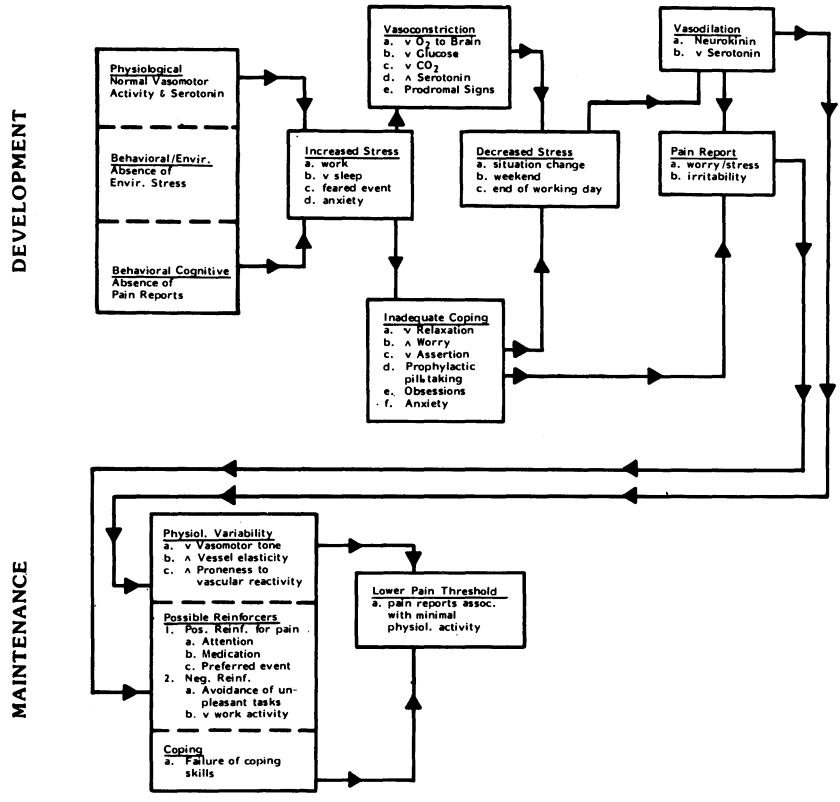

Fig. 1. A theoretical model of the development and maintenance of migraine activity. Physiological factors are presented in the top portion of the figure, while behavioral/environmental and behavioral/cognitive variables are presented in the center and lower portions, respectively.

mental, and behavioral/cognitive variables that may be important in the development and maintenance of migraine headaches.

In Figure 1, physiological factors are presented in the top portion of the model, while behavioral/environmental and behavioral/cognitive factors are presented in the center and lower portions of the figure. The interrelationships among the three levels of activity are indicated by the arrows showing the postulated progression of events that may precede and maintain the migraine attack. As indicated in the figure, prolonged vasoconstriction on the physiological level and the absence of adequate cognitive coping skills may account for the failure to reduce environmental stress or alter physiological activity. A change in the environment, such as returning home at the end of a working day, may be associated with increased relaxation, rebound vasodilation, and subsequent pain report.

In some individuals, reports of headache may be maintained by the antecedent and consequent physiological, behavioral/environmental, and behavioral/cognitive variables presented in Figure 1. On the physiological level, repeated migraine attacks may produce a structural change in the vessel wall, such as decreased tone of the smooth muscle lining the vessel and increased vascular reactivity. An individual's threshold for pain may be lowered by an increased susceptibility to migraine attacks associated with increased sensitivity. The operant model proposed in the maintenance phase of Figure 1 may account for reports of pain in the presence of lowered or negligible levels of physiological activity. For example, a report of pain may be followed by positive or negative reinforcement such as attention or withdrawal from work. Reinforcement may have two primary effects on the patient's pain behavior. First, there may be a lowered threshold for reporting pain in the future so that pain may be reported even in the absence of sufficient physiological/vascular changes. Second, the patient's ineffective coping strategies may be maintained, which results in continued failure to adequately deal with environmental stresses.

ASSESSMENT

Differential Diagnosis

The most commonly required diagnostic distinction for headaches has been between tension and migraine headaches. These two types of headaches differ in several respects. First, the presence of prodromal symptoms such as visual disturbances or nausea and vomiting are more frequent in migraine than in tension headache. Second, migraine headache pain is described as throbbing, pulsating, and unilateral, while tension headaches are described as a bilateral feeling of tightness or "bandlike" pressure, occurring around the crown of the head. Migraine headaches tend to occur more frequently in persons with a family history of that type of headache than do tension headaches.

An adaptation of Wolff's (24) summary of diagnostic considerations for the classification of headache symptoms is presented in Table 1.

Migraine symptomatology may be associated with other medical and neurological conditions (24). Headaches may be due to infections, tumors, ocular pressure, nasal and sinus inflammation, cranial neuralgia (24), etc., and a thorough medical/neurological evaluation clearly needs to be performed before diagnosing a patient's head pain as migraine. Studies by Wolff and his associates (24) have shown a wide variation in the medical and environmental conditions associated with migraine activity. The chances of inappropriate diagnosis and treatment are increased in the absence of appropriate assessment procedures. The administration of a powerful

TABLE 1
A CLASSIFICATION OF HEADACHE

I. VASCULAR HEADACHES OF THE MIGRAINE TYPE. Recurrent attacks of headache widely vary in intensity, frequency, and duration. The attacks are commonly unilateral in onset, are usually associated with anorexia and sometimes nausea and vomiting, and in some are preceded by or associated with conspicuous sensory, motor, and mood disturbances; they are often familial.
   A. "CLASSIC" MIGRAINE. Vascular headache with sharply defined, transient visual, other sensory and/or motor prodromes.
   B. "COMMON" MIGRAINE. Vascular headache without striking prodromes and less often unilateral than A and C. Often associated with environmental changes or stress and described as "summer," "Monday," "weekend," "relaxation," "premenstrual," and "menstrual" headache.
   C. "CLUSTER" HEADACHE. Vascular headache, predominantly unilateral on the same side, usually associated with flushing, sweating, rhinorrhea, and increased lacrimation, brief in duration and usually occurring in close-packed groups separated by long remissions.
   D. "HEMIPLEGIC" MIGRAINE AND "OPTHALMOPLEGIC" MIGRAINE. Vascular headache featured by sensory and motor phenomena which persist during and after the headache.
   E. "LOWER-HALF" HEADACHE. Headache of possible vascular mechanism centered primarily in the lower face. In this group are some instances of atypical facial neuralgia, sphenopalatine ganglion neuralgia, and vidian neuralgia.

II. MUSCLE CONTRACTION HEADACHE. Ache or sensations of tightness, pressure, or constriction, widely varied in intensity, frequency, and duration, sometimes long lasting, and commonly suboccipital. They are associated with sustained contraction of skeletal muscles in the absence of permanent structural change, usually as part of the individual's reaction during life stress.

III. COMBINED HEADACHE: VASCULAR AND MUSCLE CONTRACTION. Combinations of vascular headache of the migraine type and muscle contraction headache, prominently coexisting in an attack.

IV. HEADACHE OF NASAL VASOMOTOR REACTION. Headaches and nasal discomfort (nasal obstruction, rhinorrhea, tightness, or burning), recurrent and resulting from congestion and edema of nasal and paranasal mucous membranes, and not proven to be due to allergens, infectious agents, or local gross anatomic defects.

V. HEADACHE OF DELUSIONAL, CONVERSION, OR HYPOCHONDRIACAL STATES. Headaches of illnesses in which the prevailing clinical disorder is a delusional or conversion reaction and a peripheral pain mechanism is nonexistent.

VI. NONMIGRAINOUS VASCULAR HEADACHES. Associated with generally nonrecurrent dilation of cranial arteries.
   A. SYSTEMIC INFECTIONS. Fever usually present.
   B. MISCELLANEOUS DISORDERS. Hypoxic states, carbon monoxide poisoning, effects of nitrates, and other chemical agenst with vasodilator properties, caffeine-withdrawal reactions, circulatory insufficiency in the brain (certain circumstances), postconcussion reactions, post-convulsive states, "hangover" reactions, foreign protein reactions (abrupt elevation of blood pressure as with paraplegia or pheochromocytoma), and certain instances of essential hypertension (e.g., those with early-morning headache).

VII. TRACTION HEADACHE. Headaches resulting from traction on intracranial structures, mainly vascular by masses.
   A. TUMORS
   B. HEMATOMAS.

C. ABSCESSES.
D. POSTLUMBAR PUNCTURE HEADACHE.
E. PSEUDOTUMOR CEREBRI: VARIOUS CAUSES OF BRAIN SWELLING.

VIII. HEADACHE DUE TO OVERT CRANIAL INFLAMMATION. Headaches due to readily recognized inflammation of cranial structures: resulting from usually nonrecurrent inflammation, sterile or infectious.

IX. HEADACHE DUE TO DISEASE OF OCULAR, AURAL, NASAL AND SINUS, DENTAL OR OTHER CRANIAL or NECK STRUCTURES.

X. CRANIAL NEURITIDES. Trauma, new growth, or inflammation.

IX. CRANIAL NEURALGIAS.

Adapted from Wolff, H. G. *Headache and Other Head Pain.* New York: Oxford University Press, 1963, pp. 54–55. "Classification of headache pain and diagnostic considerations."

vasoconstrictive agent such as ergotamine, with subsequent alleviation of pain, was considered a useful test for the diagnosis of migraine headache, since nonmigraine headache pain should not be affected by the vasoconstriction. However, not all patients with migraine symptomatology respond to vasoconstrictive agents in this way.

In accordance with the model of the migraine syndrome shown in Figure 1, the major factors that must be assessed for behavioral treatment are: a) physiological, b) behavioral/environmental, and c) behavioral/cognitive. Eash of these aspects of behavioral assessment will be discussed separately. Assuming that medical evaluations are being conducted concurrently, or already completed, one may continue the assessment by administration of a screening questionnaire designed to evaluate various areas of migraine and tension headache symptomatology (6).The questionnaire was designed by Epstein and Abel (6) and is presented in Figure 2.

The data obtained from the headache questionnarie may be useful in differentiating between migraine and tension headaches. In a study reported by Blanchard, Theobald, Williamson, Silver,and Brown (3), the questionnaire was administered to 29 migraine patients. The percentage of patients endorsing an item in the always/usually, sometimes, or infrequent/never categories, is presented below the corresponding response category as indicated in Table 2.

The distribution of the percentages shows that questions related to migraine symptoms are often recorded as always or usually by the migraine patients. In contrast, most tension headache symptoms were scored as infrequently or never. These preliminary data indicate that this questionnaire may be a useful method for assessing migraine and tension headache symptoms. In addition to self-report frequency items, a diagram of various head positions is provided with the questionnaire so that the patient can describe the location of his typical head pain. The location of head pain may also aid the examiner in differentiating migraine and tension headache symptoms, since many migraine patients report temporal and unilateral head

HEADACHE QUESTIONNAIRE

Name: _____ Date: _____
Age: _____
Sex: _____
Marital Status: _____
Race: _____
Years of Education _____

1. Headaches are a problem for me and I frequently take medicine for relief.
   Yes _____ No _____
2. I have had headache problems since the age of _____.
3. I have the following number of headaches per month _____.
4. I have been to a doctor for my headaches.
   Yes _____ No _____
   If yes, his diagnosis was _____.
   (If don't know, put DK)
5. Have you had any of the following:
   (If yes, check if the problem might be associated to the headaches.)
   Eye problems _____ _____
   Ear problems _____ _____
   Dental problems _____ _____
   Sinus problems _____ _____
   Head injury _____ _____
   Seizures or other
   neurological problems _____ _____
6. I have been under stress which may be related to my headache.
   Yes _____ No _____
   If yes, what type of headache? Migraine _____
   Tension _____
   Other (please explain) _____

INSTRUCTIONS: Please check appropriate block in each question.

Scale	*Always*	*Usually*	*Some-times*	*Infre-quently*	*Never*
1. I awaken with the headache	_____	_____	_____	_____	_____
2. My headache ends within 24 hours	_____	_____	_____	_____	_____
3. I have sudden attacks of headaches	_____	_____	_____	_____	_____
4. My headache is worse at the end of the working day	_____	_____	_____	_____	_____
5. My headache is throbbing or pulsating	_____	_____	_____	_____	_____
6. My headache can be described as a feeling of tightness or external pressure on my head (bandlike or caplike)	_____	_____	_____	_____	_____
7. My headache begins on one side	_____	_____	_____	_____	_____
8. My headache starts in the neck, shoulders, and back of the head	_____	_____	_____	_____	_____

9. My headache is associated with visual changes like seeing stars, blind spots double vision, and/or intolerance to light	____	____	____	____	____
10. I have nausea and vomiting with my headache	____	____	____	____	____
11. My headache gets worse if I strain, cough, or lift objects	____	____	____	____	____
12. My headache is better if I can loosen up my neck muscles	____	____	____	____	____
13. Aspirin, Anacin, Bufferin, Excedrin, BC, Alka-Seltzer relieve my headache	____	____	____	____	____
14. I take a prescribed medication to prevent a full-blown attack of headache	____	____	____	____	____
15. My headache starts during periods of relaxation	____	____	____	____	____
16. Please place X(s) on the figures to indicate where your head pain is.					

Fig. 2. A screening questionnarie for tension/migraine headache pain, developed by Epstein and Abel (6).

pain, while tension headache pain is usually described as bilateral and may involve forehead, neck, and even shoulder muscles.

Physiological Factors

One of the first and most important steps in physiological assessment is to establish basal levels of physiological measures during resting or habituation sessions. For example, one may wish to record frontalis EMG, finger temperature, finger and temporal blood volume, respiration and heart rate, and to establish basal levels of activity and monitor changes in these systems as a function of treatment conditions. The pretreatment physiological information may be critical in the selection of treatment procedures because many subjects may have basal levels of physiological activity near or within "normal" or optimal ranges. For example, despite the myth that all migraineurs have cold hands, we have seen migraine patients with finger skin temperatures consistently above 34°C. These patients have considerable difficulty producing further increases in skin temperature with skin temperature biofeedback.

It is important to monitor the patient's physiological behavior under both adaptation and treatment conditions, and to establish a stable baseline prior

TABLE 2

The percentage of migraine patients endorsing each item of the headache questionnaire, in the always/usually, sometimes, or infrequently/never categories

Scale	*(Always/ Usually)*	*Sometimes*	*(Infrequently/ Never)*
1. I awaken with the headache	62%	3%	34%
2. My headache ends within 24 hours	48%	21%	31%
3. I have sudden attacks of headaches	45%	24%	31%
4. My headache is worse at the end of the working day	34%	24%	41%
5. My headache is throbbing or pulsating	72%	17%	10%
6. My headache can be described as a feeling of tightness or external pressure on my head (bandlike or caplike)	24%	14%	62%
7. My headache begins on one side	90%	3%	7%
8. My headache starts in the neck, shoulders, and back of the head	21%	17%	62%
9. My headache is associated with visual changes like seeing stars, blind spots double vision, and/or intolerance to light	76%	14%	10%
10. I have nausea and vomiting with my headache	52%	38%	10%
11. My headache gets worse if I strain, cough, or lift objects	48%	21%	31%
12. My headache is better if I can loosen up my neck muscles	21%	17%	62%
13. Aspirin, Anacin, Bufferin, Excedrin, BC, Alka-Seltzer relieve my headache	37%	14%	83%
14. I take a prescribed medication to prevent a full-blown attack of headache	62%	3%	34%
15. My headache starts during periods of relaxation	21%	55%	24%

to the introduction of procedures designed to modify physiological responses. For example, a patient's skin temperature may vary considerably during the initial stages of treatment due to exposure to a novel setting. Thus, several adaptation sessions should be provided before obtaining basal skin temperature records. The patient's physiological activity may also vary with a session, even after a lengthy adaptation period. It is important that a stable level of activity be established prior to the introduction of treatment procedures so that the effect of treatment can be assessed. For example, a patient's skin temperature may steadily increase during a no-feedback baseline condition, and continue to increase during the introduction of feedback for skin temperature increases. In this case, the effect of feedback is uncertain, since skin temperature was already increasing before introduction of the feedback procedures. Had the experimenter waited until skin temperature had stabilized, the effect of skin temperature feedback could be more clearly evaluated.

Another issue in physiological assessment is the utilization of repeated physiological measurements during all baseline and treatment phases. Gradual improvement in the patient's ability to control a physiological response can be determined only if this data is obtained in all phases of treatment. Ideally, one may also wish to obtain several repeated assessments during headache and nonheadache periods. Further discussion of physiological recording techniques and pyschophysiological assessment is provided by Epstein (5).

Behavioral/Environmental Factors

Antecedent Conditions

Detailed observation has established that migraine pain may be stress-related or hormonal, or that it may involve a host of environmental triggers, e.g., food or alcohol. A thorough treatment plan should include an evaluation of preheadache environemntal events. The best way of obtaining this information is usuallly to ask the patient to systematically monitor a variety of potential precipitants, e.g., frequency and severity of stressors, alcohol intake, etc., while also recording the occurrence of headaches. This assessment information can be obtained at the same time that baseline headache data is being collected.

Epstein and Abel (6) have designed a data collection procedure that is useful in obtaining headache frequency, duration, and intensity measures. The patient is given a small pocket notebook, or index cards, which he uses as a recording form for self-monitoring of headache activity. The patient is

Headache rating:

0-No headache
1-Only aware of headache when attention is devoted to it.
2-Mild headache, could be ignored at times.
3-Headache is painful but can continue doing job.
4-Very severe headache, can do only undemanding tasks.
5-Intense, incapacitating headache.

Recording Sheet:

Date	Time	Situation Before	Situation After	Rating	Comments Duration Medication
	Breakfast				
	Lunch				
	Dinner				
	Bedtime				

Fig. 3. A sample data sheet for collecting headache data. The patient is given a booklet or several index cards as depicted on the recording sheet. The rating scale can be written in the front of the booklet.

instructed to make an entry on the sheet at least four times per day: Breakfast, lunch, dinner, and bedtime. The occurrence or nonoccurrence of a headache during these intervals is recorded and the patient also provides information describing the environmental situation before and after a headache. Space is also provided on the data sheet for the patient to rate his headache intensity, duration, medictions, or use of other coping strategies. A sample data sheet is provided in Figure 3.

Consequent Conditions

A complete headache assessment should also include an evaluation of the consequent conditions associated with headache reports. As noted above, the client may be asked to record headache activity by providing a brief description of the antecedent and consequent events and a rating of headache intensity. Although present evidence indicates a strong physiological component to migraine activity, pain reports may also be conceptualized as operant behavior.

Pain behavior may become independent of physiological activity given the appropriate demand characteristics of the situation and the occurrence of reliable consequent events. Specifically, pain reports may be influenced by

positively reinforcing events. For example, certain individuals may not receive attention from family members in the absence of reported pain. Attention from significant others which is contingent upon pain report may serve to increase the frequency of pain reports, with minimal or no physiological involvement. The process of negative reinforcement may also influence pain reports. For example, an individual who reports severe pain may not be expected to fulfill certain occupational or family responsibilities. Pain reports may lead to withdrawal or avoidance of unpleasant tasks, social events, etc. One may also observe an interaction between the two modalities of reinforcement. For example, an individual with chronic head pain may be relieved from work responsibility and receive contingent family attention or monetary compensation for the disability. It should be strongly emphasized that a careful analysis should be performed before concluding that an individual's pain reports are being maintained by environmental conditions alone. Careful attention must be given to the role of pain as a punishing event which produces prolonged physical discomfort, inconvenience, and interruption of possible reinforcing activities.

One possible role of operant reinforcement may be to influence an individual's threshold for reporting pain. The development of migraine pain may initially involve a strong physiological component and an absence of reinforcing events in addition to the presence of punishing consequences. Certain individuals may be sensitive to low levels of physiological activity and therefore will more readily report headache pain than those who have higher thresholds for detection of physiological activity. For this reason, patients with lower thresholds may report pain more frequently than those less sensitive to physiological activity. The conditions consequent to pain reports may interact with the initial level of pain sensitivity to produce changes in the threshold for reporting headache activity, and eventually gain valued reinforcement for the migraine patient.

Behavioral/Cognitive Factors

Another important component of the assessment package is an evaluation of behavioral and cognitive variables. This includes identification of the patient's coping strategies, self-statements, and interpretation of environmental events. Bakal (2) and Mitchell et al. (17) suggest that migraine activity may be influenced by strong cognitive or emotional reactivity to such difficulties as increased work pressure, difficulties in self-expression, tension, and financial or career distress. The degree to which an individual can successfully cope with these difficulties may relate to his headache activity. A lack of appropriate skills to deal with adverse social or occupational conditions may be associated with increased stress and a higher probability of headache complaints in an individual with a predisposition for migraine

activity. Consequently, Mitchell feels that improvements in an individual's coping strategies are critical to the reduction of migraine activity.

Coping skills and interpersonal stress may be assessed during the baseline period by examining the patient's data and noting associations between the onset and offset of headaches and the type of events that precede or follow them. Several self-report inventories are available to measure assertiveness, social anxiety, fear of negative evaluation, specific fears, tension and anxiety, marital stress, etc. (11), which may be used in combination with behavioral role-playing tests in which the patient is confronted with stressful situations and the effectiveness of his response ascertained. The degree to which an individual can make an effectual response to reduce environmental stress, redirect maladaptive thinking patterns, or express feelings of assertiveness and anger in a socially appropriate fashion may be related to his headache symptomatology (17).

TREATMENT

Biofeedback and Relaxation

Skin Temperature

One of the earliest techniques to be used in the treatment of migraine headaches was skin temperature feedback. Temperature is monitored from a peripheral site, such as the index finger, and subjects receive continuous feedback of changes in finger temperature. An early assumption for the use of this technique in the treatment of migraines was that the changes in finger temperature produced vasodilation at the local site and redirected the blood flow of the cephalic beds, thus reducing the blood volume in temporal arteries. Since the actual headache phase of migraine attacks is associated with a rebound vasodilation of the temporal arteries, it was assumed that decreasing temporal blood volume could abort or reduce migraine pain. Several studies have demonstrated improvement of migraine symptomatology as a function of feedback-influenced changes in finger skin temperature. Sargent, Green, and Walters (20) used a combination of skin temperature biofeedback procedures and autogenic statements for increasing finger temperature and found a 63% improvement rate in migraine patients. However, these data were derived from a series of case studies that lacked adequate experimental control procedures. Also, the dependent measures were not clearly specified and no baseline measures were collected. Wicramaskera (22) compared the effects of temperature and frontalis EMG feedback in two systematic case studies and observed declines in headache frequency and duration in association with temperature feedback. In a single-

group outcome study, Medina, Diamond, and Franklin (14) used a combination of frontalis EMG biofeedback and skin temperature feedback on a mixed tension and migraine headache population. Although a total of 13 of 27 subjects showed improvement, the measures were poorly defined and the poor experimental design precludes any meaningful comparison between the treatment procedures. In an interesting case study by Johnson and Turin (12), one subject was given feedback for increasing and decreasing skin temperature. Reliable changes in skin temperature were observed in both phases, headache frequency and duration, and medications were increased during the cooling periods and decreased during the warming periods.

The results of the above studies have not offered clear support for the efficacy of skin temperature feedback for the treatment of migraine headaches, although it appears that some aspects of the procedure may merit further investigation. Although initially Sargent et al. (20) assumed that peripheral vasodilation was inversely related to cranial vasoconstriction, further investigation found no correlation between increases in finger temperature and decreases in forehead temperature. This finding suggests that hand warming has little or no effect on cephalic blood flow.

The relationship between cephalic and digital blood flow may be assessed by simultaneous measurement of blood volume at the two sites, during baseline and feedback conditions. Koppman, McDonald, and Kunzel (13) found that feedback-influenced vasoconstriction of the temporal artery was not correlated with digital blood volume changes. Price and Tursky (19), however, found that generalized relaxation and finger pulse volume feedback resulted in temporal and digital artery vasodilation. The discrepancy between the two studies may be partially due to differences in measurement techniques and procedures, and the effects of generalized relaxation on vasomotor function may also be important in evaluating the two studies. As Price et al. (19) point out, skin temperature feedback may act to increase an overall state of relaxation and in this way produce vasodilation at cephalic and digital sites. The data of Koppman et al. (13) was based on voluntary changes in temporal artery vasodilation and vasoconstriction and did not use relaxation procedures. Insufficient time was permitted between vasodilation and vasoconstriction trials to allow the subject to relax. From these studies it appears that a positive correlation between cephalic and digital blood flow may be observed only during periods of generalized body relaxation. Skin temperature feedback may be useful in reducing overall muscle tension and enhancing generalized relaxation.

The research on blood flow discussed above may have some implications for the treatment of migraine headaches. First, generalized relaxation and skin temperature feedback may be equally effective for the relief of migraine headaches. Second, neither of these procedures should be useful as a method for termination or abortion of a migraine attack that has already entered the

painful vasodilation phase. In contrast, both the temperature feedback and relaxation procedures should be more useful in the prevention of headaches by counteracting the vasoconstriction of the prodromal phase,thus reducing the likelihood that painful rebound vasodilation will result. This hypothesis seems plausible, since anecdotal data suggest that most migraineurs treated with temperature feedback or relaxation experience a general decrease in headache activity but can seldom terminate a headache that has already begun.

Skin Temperature and Relaxation

The relative effects of skin temperature biofeedback and relaxation were directly assessed in a controlled group outcome study by Blanchard, Theobald, Williamson, Silver, and Brown (3). These authors compared the effects of temperature biofeedback and progressive muscle relaxation to a waiting-list control group on multiple measures of migraine activity. After extended laboratory training, both treatment groups showed significant improvement on all dependent measures.The two treatment groups differed significantly from the waiting-list control group on all dependent measures except headache frequency. A comparison of the two treatment groups indicated a slight advantage for relaxation,and biofeedback procedures were observed at one-, two-, or three-month follow-up assessment. The results of this study indicate that relaxation and biofeedback procedures are associated with similar levels of improvement and lend additional support to the idea that relaxation and generalized vasodilation are the salient features of temperature biofeedback (3).

Cephalic Vasomotor Feedback

Another biofeedback approach in the treatment of migraine headaches is cephalic vasomotor feedback. Cephalic vasomotor feedback (CVMF) refers to visual or auditory feedback reflecting the momentary changes in blood volume (BV) and/or blood volume pulse (BVP) of the temporal artery. In the treatment of migraine, CVMF is usually arranged to follow criterion reductions in BV or BVP, indicating vasoconstriction of the temporal arteries. The rationale for the use of the technique comes from research on the pathophysiology of migraine, and the success of vasoconstrictive agents such as ergotamine tartrate, in reducing migraine pain. Headache pain is associated with extreme vasodilation of the temporal artery, and relief from pain has been observed if the vasoconstrictive substances are administered prior to the establishment of local edema (4).

Feuerenstein, Adams, and Beiman (8) compared frontalis EMG feedback and CVMF in a single case study of a mixed, migraine-tension headache client. They found both types of feedback effective in reducing the frequency of temporal artery vasospasms, with CVMF showing superior reduction in overall headache activity. Feuerenstein and Adams (7) compared both EMG feedback and CVMF in each of two migraine and two tension headache clients. The authors noted CVMF was associated with improved headache activity and BVP changes in one migraine client, while one tension headache client showed similar improvements in headache activity and a reduction in frontalis EMG levels during EMG feedback. The results of the remaining two patients were inconsistent with the above, as both the migraine and tension headache patients showed some improvement in symptomatology but changes in both EMG and BV were observed during both CVMF and EMG feedback. Although the data of Feuerenstein et al. (7, 8) offers some preliminary evidence for CVMF in the treatment of migraine headaches, only a small number of subjects were used, and it is difficult to evaluate the association between changes in migraine symptomatology and the introduction of experimental procedures.

In a well-controlled group outcome study by Friar and Beatty (9), feedback was presented following temporal artery vasoconstriction in one group of migraine patients while a second group received feedback for peripheral vasoconstriction. Subjects were carefully screened, and the authors also took precautions to ensure minimal recording artifact, sufficient habituation time, and stability in blood volume data before implementing the experimental conditions. Both groups showed criterion changes in vasoconstriction at the site of feedback, but cranial and peripheral vasomotor changes within the subjects were uncorrelated. Statistically significant changes in headache activity were noted only for the group receiving feedback for cranial vasoconstriction. However, from their data, it was difficult to determine whether this improvement in headache report was clinically significant.

It seems logical that a technique designed to produce vasoconstriction should have some merit in the treatment of migraines, since vasoconstrictive agents have been used successfully in the past. However, careful evlauation is still needed to determine: If training in vasoconstriction during nonheadache periods is an effective prophylactic measure in the treatment of migraines; if vasoconstriction can be useful during intralaboratory headache periods, to abort a migraine headache; and if vasoconstriction of the temporal arteries can be voluntarily produced in the absence of feedback to reduce headache pain in nonlaboratory situations. In addition, further elaboration of the relationships among bidirectional changes in frontalis EMG, cephalic vasomotor function, and migraine activity may be useful in identifying the salient components of CVMF.

It may seem contradictory that both relaxation, which produces vasodilation, and CVMF, which is associated with vasoconstriction, are effective treatment modalities for the migraine syndrome. There may be several explanations for this anomaly, but no studies are currently available that have directly compared relaxation and CVMF. The data of Feuerenstein et al. (7) utilized both EMG and CVMF biofeedback, but the small number of subjects and the absence of the progressive relaxation procedures limit interpretations of the data. An interesting result observed by these authors was that both a tension and a migraine headache patient showed EMG and BV changes during CVMF. One would not normally expect to observe decreased EMG during CVMF. However, the distinction between vascular and muscle contraction headaches may not be as clearly defined as once thought (4). Phillips (18) has found that migraineurs have higher resting frontalis EMG levels than tension headache clients during resting and headache periods. In addition, Phillips (18) has shown that tension headache clients show some degree of vascular changes during headache and nonheadache periods. One may speculate that relaxation and vasoconstriction procedures both show some effectiveness, due to the presence of both vascular and muscle tension components in migraine patients. However, as Adams, Feuerenstein and Fowler (1) have noted, migraine subjects also show a loss of muscle tone in the vessel wall, and CVMF or progressive relaxation may act to exercise the smooth muscle of the vessel wall, increasing muscle tone and control and decreasing elasticity.

The issue of why both CVMF and relaxation show some effectiveness in the treatement of migraine headaches is unresolved. The above discussion concerning the presence of vascular and muscle tension components of migraine and tension headaches and vessel elasticity is based on the currently available data (1, 14, 18), but at this point, integration of this data is highly speculative. Further research is needed to clearly evaluate the relationship between muscular and vascular headache components and relaxation and CVMF procedures.

Cognitive Techniques

An alternative approach to the treatment of migraine headaches through modification of a proposed physiological mediator has been to improve the cognitive coping skills the patient uses to deal with life stresses. Several researchers have suggested that intense cognitive or emotional stimuli may precipitate a migraine attack in a susceptible individual (21). Mitchell and his associates (15, 16, 17) have argued that the primary goal of psychological intervention for the migraine syndrome should be to improve the patient's ability to modify his occupational, social, or home environment and reduce emotional reactivity to stressful situations.

In a series of controlled group outcome studies by Mitchell (15) and Mitchell and Mitchell (16), different groups of migraine subjects were treated with relaxation, assertive training, desensitization, and combinations of these procedures. The results showed that progressive muscle relaxation alone was not more effective than a no-treatment control on pre- and posttreatment assessment of headache frequency, duration,and intensity. Other subjects were given a combination treatment of desensitization plus assertive training and were instructed to relax in the presence of stress-imagined scenes, and to cognitively "rehearse" the appropriate coping response to the stressful situation. The subjects given the combination of desensitization plus assertive training showed more improvement in headache activity and medication intake than subjects treated with a combination of desensitization and deep muscle relaxation. Using a variant of a multiple baseline across subjects design, Mitchell and White (17) compared the relative contribution of four strategies of self-intervention for migraine headaches. The four strategies were: 1) self-recording of headache intensity, frequency, and duration; 2) self-monitoring of stress-related events precipitating a headache; 3) progressive muscle relaxation and desensitization; and 4) a self-management package consisting of instructions in thought stopping, time out, flooding, assertion training, habit reversal, and rational thinking. Twelve subjects were studied over a period of 48 weeks, divided into four 12-week phases. All subjects initially self-recorded headache activity in phase 1, and self-monitoring was introduced in addition to self-recording for nine of the subjects for the remainder of the study, while the other three subjects continued to self-record only headaches for the subsequent 36 weeks. The additional treatment procedures were introduced in a sequentially additive fashion at 12-week intervals for the two remaining sets of three subjects each. The results showed that the self-recording strategies alone were not associated with significant reductions in headache activity. The self-management package was found to be more effective than desensitization plus muscle relaxation, but both desensitization plus relaxation and the self-management techniques were more effective than the self-recording strategies in reducing migraine activity.

The data presented by Mitchell et al. (16, 17) lend support for the efficacy of coping-skill techniques in the treatment of migraine headaches. Training in coping skills has the appeal of effecting a permanent change in a subject's behavior and supplying him with skills that may be applied across various stress-related situations. However, there are several imperfections in their methodology that weaken the final conclusions. First, much of the data is based on phone contact with the clients with no evaluation of reliability or subject compliance with the recording techniques. More important, the effective treatment techniques were administered via audio cassette without a measure of patient compliance to treatment schedules, practice time, etc. Third, the inclusion of multiple treatment approaches within one group of

subjects makes it impossible to identify the salient features of treatment. Finally, the exclusion of physiological data makes it impossible to evaluate changes in the physical aspects of migraine activity.

SUMMARY

Migraine activity is a type of vascular disturbance, characterized by episodic and severe pain occurring primarily on one side of the head and often preceded by prodromal symptoms such as scotoma, photophobia, nausea, vertigo, or other sensory/motor disturbances. Traditional conceptualizations of migraine activity have stressed differential diagnostic techniques and pharmacological intervention. The current discussion has emphasized the behavioral and physiological components of pain and focused on the analysis of antecedent and consequent conditions associations with migraine activity. However, clear experimental data are needed to support these concepts. Behavioral treatment approaches have focused on biofeedback, relaxation, and teaching clients coping skills. Current research on this topic suggests: Skin temperature biofeedback may be an effective treatment modality, but it may exert its effect through a generalized relaxation effect; cephalic vasomotor feedback offers some promise, but further research is needed to fully evaluate its efficacy; progressive muscle-relaxation exercises are effective and statistically no different from biofeedback techniques in several outcome measures; cognitive techniques that emphasize increasing coping skills have shown promising results, but future research is needed to improve methodological precision.

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The Comprehensive Handbook of Behavioral Medicine, Volume 2

CHAPTER 12
Behavioral Control of Tension Headaches

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Paul M. Cinciripini

INTRODUCTION

Headache pain is a widely reported physical complaint. Survey data indicates that up to 65% of nonclinical populations report periodic headaches (20). The majority of headaches can be classified as tension or migraine varieties, with tension headaches accounting for up to 80% of headaches (1). The purpose of this chapter is to present research relevant to the assessment and treatment of tension headaches.

Headaches are often considered to be psychophysiological disorders in which environmental stressors initiate or contribute to physiological changes, which are the basis for reports of headache pain. The specification of the relationship between environmental demands, physiological change, and pain report is integral to the assessment and treatment of headaches. Although the primary target response in the treatment of headaches is reported pain, a complete assessment of any pain behavior also requires measuring the physiological responses that are assumed to be the basis for pain, as well as the disruption and change in behaviors that are a function of pain. The tripartite model of assessment that conceptualizes headaches in terms of physiological, cognitive, and motoric behavior will serve as the focus of the present chapter (21).

Tension headaches are typically assumed to be the result of sustained contraction of the facial, scalp, neck, or shoulder musculature. This hypothesis predicts that headache pain is a direct function of the level of muscular activity in these areas, and that changes in headache pain are

associated with changes in tonic muscle contraction. Pain reports may also be viewed as operant behavior that may occur independent of the level of physiological activity, but which are supported by changes in the environment. The frequency and duration of headaches may be related to positive reinforcement for reports of headache pain, e.g., attention of family members, warm compresses, massages, or negative reinforcement where the report of headaches serves to remove the person from adverse environmental events such as job and family responsibility, test taking, etc. Although, Fordyce (12) emphasizes the importance of defining pain as an operant behavior, the overwhelming majority of researchers have assumed a linear relationship between physiological changes and cognitive reports of pain, *independent* of consequent environment events (19).

Both physiological and environmental factors are considered in the assessment and treatment of headaches. As noted in Figure 1, headache reports may be a function of either physiological cues, consequent environmental reinforcement, or a combination of these two factors.

ASSESSMENT

Physiological Basis for Tension Headaches

If tension headaches are a function of changes in muscle tone or contraction, then EMG data may be useful in their diagnosis. Several clear predictions can be made about EMG levels and tension headaches. First, resting EMG values should differ between tension headache and nontension headache sufferers. Budzynski, Stoyva, Adler, and Mullaney (5) suggest that resting levels of frontalis EMG are significantly higher in tension headache patients than in nonheadache patients. EMG levels at rest for headache patients average slightly over 10uv during baseline measurement. Epstein and

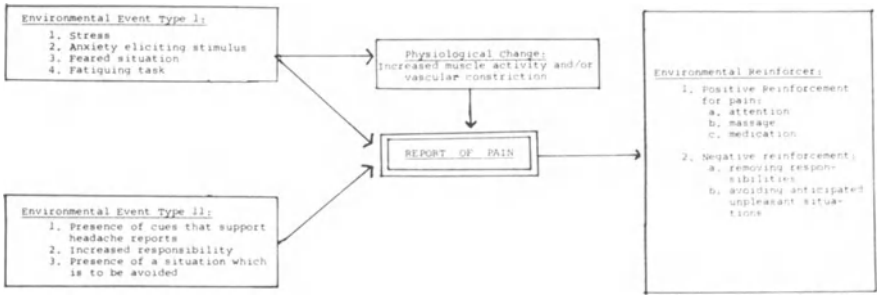

Fig. 1. A diagram of the relationship between environmental events, physiological changes, and pain reports.

Abel (8) subsequently used the 10uv level for frontalis muscle activity at rest as a cutoff criterion in the selection of tension headache patients. If resting EMG levels are to be useful in the differential diagnosis of headache vs. nonheadache patients, EMG values should differ between headache categories. It is expected that persons who report tension headaches should have higher EMG levels than persons with migraine symptoms, which are a function of vascular rather than muscular changes. However, a recent examination of EMG levels in frontalis, temporalis, neck, and trapezius muscles suggests that frontalis and trapezius EMG levels are highest in migraine headache patients, and are also higher in individuals with mixed headache complaints (tension and migraine) than in tension headaches alone (21). While frontalis EMG levels in tension headache patients were higher than EMG levels in nonheadache controls, the utility of EMG activity as an important component in differential diagnosis is reduced by the inability to predict tension or migraine headaches from resting EMG levels.

Secondly, a close relationship between EMG activity and headache pain may suggest that EMG levels in headache patients will be higher during headache than nonheadache periods. EMG measurements made from the four muscle groups listed above during headache and nonheadache periods suggest no differences in muscle activity in any of the muscles during headache and nonheadache periods (21). A related possibility is the potential correspondence between the intensity of headache pain and the intensity of EMG activity. Although it has been suggested by some researchers (17) that changes in muscle activity may parallel the intensity of pain reports, other researchers have shown an inconsistent relationship between pain intensity and the level of EMG activity (8, 9, 14). Examples taken from the data of Epstein et al. (9) show both strong and weak relationships between changes in frontalis EMG levels and reported pain intensity.

The upper graph in Figure 2 demonstrates that increases in reported pain intensity are associated with increases in EMG levels ($r = .47$). However, in the bottom graph pain reports and EMG levels have a negative correlation and high levels of pain intensity are associated with moderate to low levels of EMG activity.

Third, if EMG changes serve as the basis for headache pain, then modification of EMG activity should result in changes in symptoms. Shedivey and Kleinman (22) directly manipulated EMG levels in normal subjects and showed that subjective tension ratings and actual EMG activity were independent variables. Using a similar methodology, Epstein, Abel, Collings, Parker, and Cinciripini (9) increased and decreased EMG levels in tension headache patients and showed relative independence between subjective ratings of headache intensity and changes in frontalis EMG. In fact, reports of increases in pain occurred prior to observed EMG increases suggesting strong *instructional* control over reports of headache pain.

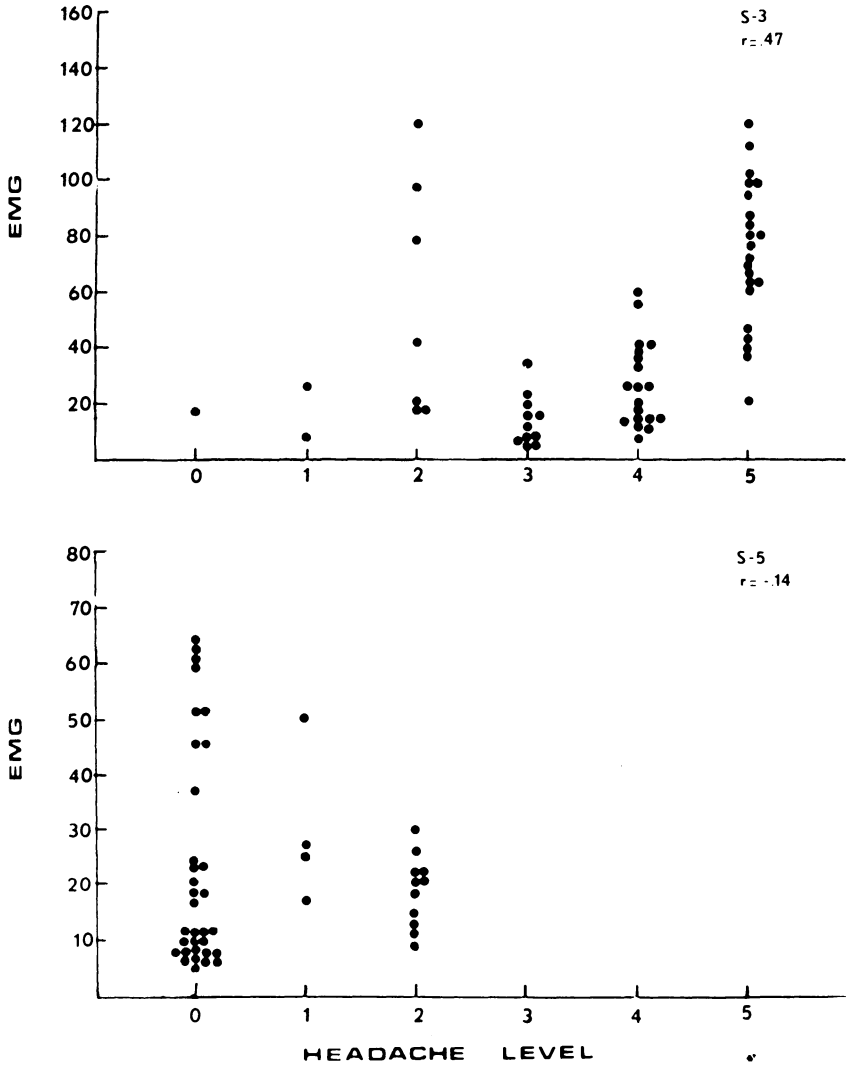

Fig. 2. Scatterplot of the relationship between EMG activity and reports of headache pain for a subject (S-3) showing a strong relationship (r = .47), and for a subject (S-5) showing a slight negative relationship (r = .14) (9).

Finally, the argument for one-to-one correspondence between EMG activity and reported pain predicts that changes in headache intensity should not occur without changes in EMG levels. Friedman and Losin (13) have shown that placebo medications are effective in reducing reported symptoms in up to 45% of tension headache patients. In addition, Epstein and Abel (8)

and Epstein et al. (9) have shown that changes in reported headache pain may occur independent of changes in EMG levels.

In summary, the available data do not support the assumption that changes in the level of muscular activity are the basis for headache reports or that EMG data are critical for making a differential diagnosis of headache pain. However, these questions have not yet been resolved. Phillips (21) suggests that there may be a positive relationship between EMG levles and reported pain in certain tension headache patients and that poor correlations may result from including mixed-headache patients in the tension headache sample. These findings do not reduce the importance of self-reported pain as a target in treating tension headaches, but highlight the influence of variables other than muscle tension changes in development and maintenance of headache pain.

The lack of correspondence between muscle activity and headache reports may indicate that other factors are important in determining the maintenance of pain reports. One possible factor is the perception of muscle activity. Perhaps an individual's sensitivity to changes in muscle activity is more important than the actual level of muscle tension. It is possible that tension headache sufferers are hypersensitive to small changes in muscle activity. Comparisons of EMG levels between headache and nonheadache sufferers cannot directly address this issue. Correlations between headache symptoms and EMG levels are more appropriate to assess this hypothesis. Headache activity does not correlate highly with EMG levels (9). Furthermore, Phillips (21) showed that EMG levels are not related to headache intensity, frequency, or the number of medications taken for the headaches. Neither of these studies suggests that tension headache patients are hyperresponsive to small muscle changes, and it is not possible to demonstrate that tension headache patients have high EMG levels or are more responsive to small EMG changes.

The underlying relationship between EMG activity and headache pain may reside in the ability to discriminate physiological events (10). If tension headache sufferers are hypersensitive to EMG changes, then they should also be able to discriminate fine changes in muscular activity. To date, this issue has not been studied in tension headache patients, although paradigms for studying physiological discrimination exist. In a review of the literature, only one study was found which directly assessed discrimination of EMG activity. Hefferline and Perera (15) showed that trained subjects could reliably detect the occurrence of muscular contractions in the extensor brevis muscle of the thumb. Research is needed on discrimination of frontalis muscular activity in tension headache patients to make a judgment concerning the hypersensitivity of headache clients to muscular changes.

The impetus for looking at the relationship between EMG changes and headache reports is usually attributed to Wolff (26). Careful examination of the physiological data presented by Wolff (26) and Tunis and Wolff (24)

suggests that increases in EMG activity accompanied by vasoconstriction of the temporal artery are present during the natural course of headache pain. This relationship can be seen very clearly in Figure 3, taken from Tunis and Wolff (24).

The data presented in Figure 3 suggest that vasoconstriction of the arteries supplying the muscles assumed to produce headache pain (e.g. frontalis, temporalis) may be important in the production of tension headaches. However, as Phillips (21) and Bakal (2) indicate, although this relationship is suggestive, sufficient data are not available to fully evaluate this possibility.

Headache Pain as Operant Behavior

The previous section stressed the influence of one class of variables on headache pain—those related to physiological changes. In behavioral terms, these physiological events can be considered as a subclass of events exerting stimulus control on headache reports, since the physiological changes occur antecedent to headache reports. In addition to stimulus control variables, consequent events may also exert control over headache behaviors. As

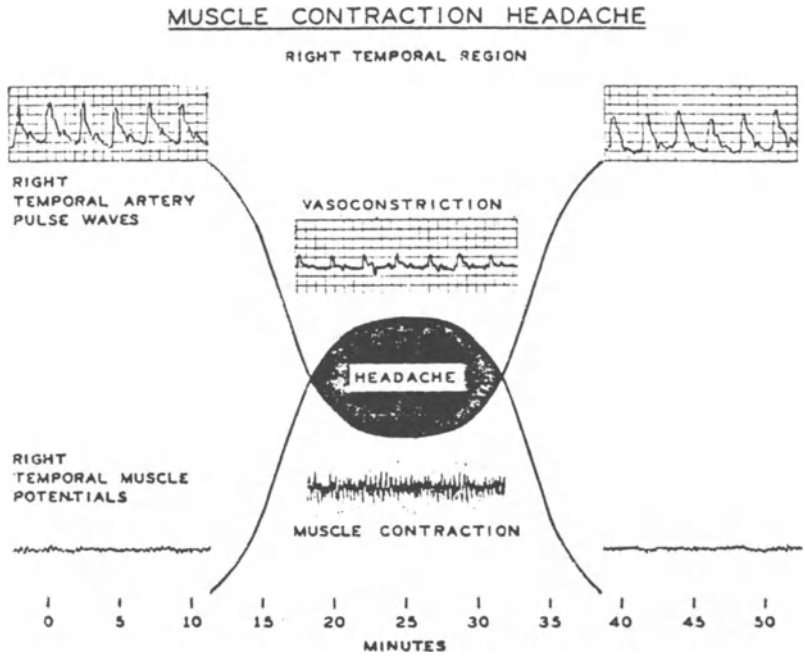

Fig. 3. Muscle contraction headache, right temporal region (24).

Fordyce (12) has shown, pain reports may be influenced by differential attention to pain behaviors. In most situations, significant other individuals respond to a pain report by physical and verbal attention, and by removing the person in pain from unpleasant situations. While these environmental contingencies may produce reports of headache pain in the absence of any physiological change, it may be most fruitful to consider how environmental changes act in concert with physiological changes to produce headache pain reports. Although the role of physiological changes in the production of headache pain has been questioned, closer analysis may show that physiological changes are important in the *acquisition* but not the maintenance of headache pain.

For example, a patient with a brief history of tension headache symptoms may base his headache reports on actual increased muscle tension. As the opportunity increases for exposure to environmental contingencies, his headache reports may be based on lower levels of EMG activity and be more dependent on the support of the environment. Pain reports and related behaviors, such as pill taking and withdrawal from social events or other responsibilities, may be controlled by the contingent application of social reinforcers. Pain reports may come totally under the control of situations in which social reinforcers are likely to occur, independent of EMG activity. While this analysis is consistent with available research on environmental determinants of chronic pain behavior, it represents a new approach to headache pain. In addition to the previously demonstrated independence of EMG activity and headache pain, and the potential role of social factors in the maintenance of changes in headache frequency and intensity, one further prediction can be made from this model. The degree of relationship between EMG activity and headache report may be negatively correlated with duration of symptoms. Subjects with short symptom duration may be more likely to base headache reports on EMG activity, while subjects with a long history of headache symptoms may be more likely to have headache reports come under the control of consequent environmental influences.

TREATMENT

Several different behavioral procedures have been used modify reports of pain in tension headache patients. The most frequently used procedures are biofeedback and relaxation exercises. These procedures are based on the assumption that headache pain is a result of sustained muscle contraction, and the treatment focus has been the reduction of muscle activity. At present, neither the environmental events which precipitated the pain, nor the consequences of reporting pain have been major targets in treatment.

Biofeedback

The initial application of biofeedback procedures to treat tension headache clients is the work of Budzynski, Stoyva, and associates. In their first study, Budzynski and Stoyva (3) demonstrated that EMG changes could be influenced by analogue auditory stimuli, and that the observed changes in muscle activity were a function of the relationship between contingent changes in the feedback signal. This auditory analogue feedback procedure was initially used in a single-group outcome study of five tension headache clients (4). Results showed a decrease in headache reports for three of the five clients. Subsequent home relaxation procedures were necessary to reduce reports of headache pain in the other two clients. Wickramasekera (25) showed similar results of biofeedback in a single-group outcome study. In a controlled-group outcome study, Budzynski et al. (5) compared the effects of analogue feedback plus self-instructed home relaxation, to pseudo-biofeedback plus relaxation instruction and to a no-treatment control group which received no relaxation instuctions. Both feedback groups had a decline in EMG activity, although during follow-up EMG activity was lower only for the biofeedback group. Headache frequency was significantly reduced for the biofeedback group, and only slightly for the pseudo-biofeedback group. The controls were unchanged. This suggests that the biofeedback procedures and not the home relaxation instructions were the critical variable. However, it is interesting to note that the two patients in the biofeedback group who did not improve were also noncompliant with home relaxation instructions, and the one patient who improved in the pseudo-biofeedback group reported adherence to home relaxation procedures.

Phillips (21) evaluated biofeedback and pseudo-biofeedback in her tension and mixed-headache clients. Posttreatment results indicate that biofeedback procedures were associated with a significantly greater reduction in frontalis EMG, headache intensity, and headache frequency than the pseudo-biofeedback procedures. EMG biofeedback appeared to work better with pure tension headaches than with mixed headaches. Biofeedback treatment was associated with an increased consumption of headache medication, which makes the interpretation of the effect of biofeedback difficult. The headaches may have decreased as a result of the feedback or the increased medication. Follow-up results suggest a continuation of decreased headache levels for subjects in the biofeedback group, with subsequent decreases in medication frequency for biofeedback subjects over time.

A single-case evaluation of the influence of biofeedback on EMG activity and headache pain was presented by Epstein, Hersen, and Hemphill (11). Biofeedback was assessed during inpatient treatment using an ABAB experimental withdrawal design which showed that feedback had a controlling effect on EMG levels and pain reports. After discharge, four

assessments of self-control of muscle activity showed that biofeedback was still effective in lowering EMG activity, that the subject could not lower his EMG in the absence of feedback, and that headaches had returned. A final procedure emphasizing loosening up the neck muscles by a neck rotation exercise and relaxing by yoga-type breathing resulted in the elimination of headache pain.

For headache relief, the control of EMG activity in the absence of feedback in the natural environment seems necessary. Epstein and Abel (8) evaluated the effects of feedback on laboratory self-control, as well as feedback effects on headache pain in the laboratory and natural environment. Of six chronic tension headache clients studied, three showed improvement in extralaboratory pain, and sustained self-control was not observed in any of the clients. In addition, a generally poor relationship between EMG activity and report of pain was noted (8, 9).

Relaxation

An alternative procedure for modifying headaches is relaxation training. The potential for relaxation treatment for headaches was first demonstrated by Tasto and Hinkle (23) in a single-group outcome study of six clients. Recently, several well-designed studies have compared relaxation to biofeedback procedures. Chesney and Shelton (6) compared the effects of relaxation vs. biofeedback vs. a combined relaxation and biofeedback procedure and a no-treatment control. Cox et al. (7) evaluated biofeedback vs. muscle relaxation vs. medication placebo, and Haynes et al. (14) compared biofeedback, muscle relaxation, and a no-treatment control. In these studies relaxation was observed to be equivalent (7, 14) or superior (6) to biofeedback procedures. Chesney and Shelton (6) suggest that a combined biofeedback and relaxation procedure offers no advantage over muscle relaxation alone. The relaxative effectiveness of biofeedback, relaxation, and no-treatment control procedures on headaches from Haynes et al. is shown in Figure 4. The equivalence of effects for both biofeedback and relaxation procedures suggests that relaxation may be a more cost-beneficial treatment. The additional expense of biofeedback equipment could only be justified if biofeedback produced clearly superior results.

Cognitive Control

The studies discussed above emphasized the modification of the physiological substrate for headache pain by muscle relaxation and biofeedback. Recently, Holroyd et al. (16) investigated cognitive coping strategies as a way to modify an individual's cognitive and physiological response to stress. The authors compared the effect of a stress-coping

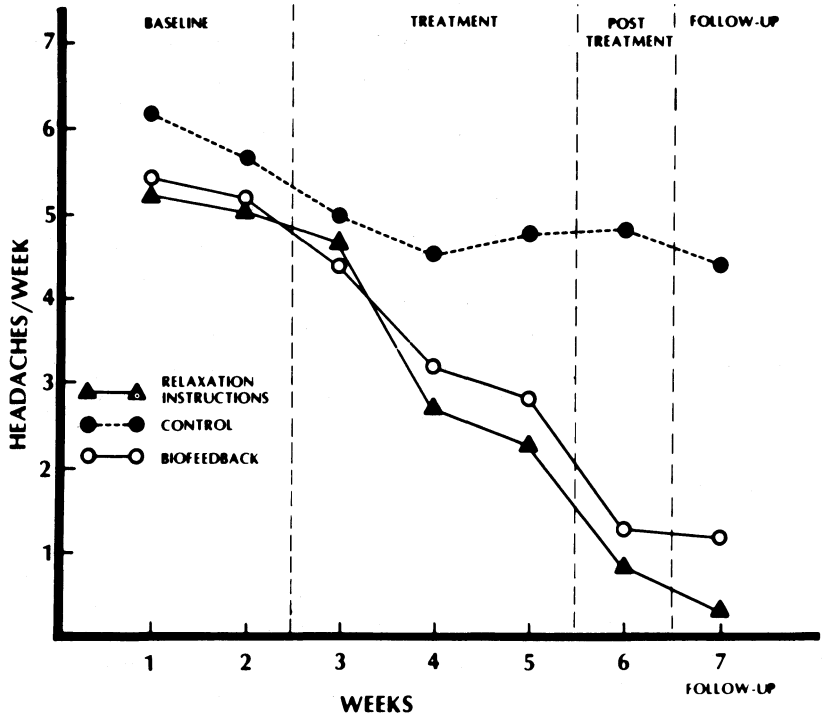

Fig. 4. Mean headache rate (headaches/week) for the 2-week pretreatment phase, the week following treatment, and at follow-up as a function of intervention procedures (14).

technique to biofeedback and a waiting-list control on a pre/post analysis of self-reported headache activity. Stress-coping strategies were found to be superior to the biofeedback and control conditions in reducing headache activity. Although biofeedback signficantly reduced frontalis EMG tension, no significant changes in headache activity were seen between the control and biofeedback groups.

SUMMARY

In summary, these studies suggest several tentative conclusions. 1) The relationship between muscle activity and pain report has not been clearly specified. It is probable that some proportion of headache patients may report pain as a function of changes in muscle tension. Other individuals may report headache pain as a function of vasoconstriction, external reinforcement, or unspecified variables. Procedures to identify and assess controlling variables are needed.

2) Biofeedback and relaxation procedures appear to produce equivalent results in the treatment of tension headache pain. Relaxation is the preferred treatment because it is significantly cheaper to develop and implement, and it is easier to practice at home.

3) The development of alternative procedures such as the cognitive control strategies used by Holroyd et al. (16), self-management procedures like those developed by Mitchell and White (18), or operant control for pain presented by Fordyce (12) should be given clinical and research attention.

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The Comprehensive Handbook of Behavioral Medicine, Volume 2

CHAPTER 13
Behavioral Intervention in Pain Related Problems in Dentistry

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Dentistry has long been concerned with the treatment of pain-related disorders and has traditionally relied upon pharmacological agents and surgical and dental procedures to achieve pain relief (4). Although often adequate for the amelioration of many acute and chronic pain conditions, traditional dental interventions frequently have been ineffective in reducing or eliminating some pain and pain behaviors, e.g., those associated with temporomandibular joint pain and dysfunctional disorder (TMJ disorder) (4, 61). Researchers have long recognized the emotional components of these disorders (71, 72, 79), and recent work by Fordyce (26) has suggested that some typical aspects of pain and pain behavior may be learned, which implies that behavioral approaches may be useful in treating this type of pain. This chapter discusses the application of behavioral intervention strategies to modifying pain-related problems, such as TMJ disorder and bruxism in dentistry.

TEMPOROMANDIBULAR JOINT PAIN AND DYSFUNCTION

The diagnosis and treatment of temporomandibular joint pain and dysfunction (TMJ disorders), also known as myofascial pain dysfunction, is a major problem for dentistry (38, 69). Although an estimated 24% of the population experiences TMJ pain (2), the etiology of TMJ disorders is not understood (38). Clear physiological or morphological factors frequently cannot be shown in many chronic TMJ patients. Pain is the major symptom

of these disorders, which gives them all of the complexities of the pain phenomenon found in other pain syndromes. Recent approaches to the treatment of chronic pain have emphasized the necessity of focusing on the psychological and behavioral components of the pain, rather than attempting to treat only an "organic cause" for the pain—a strategy that often does not result in a modification of pain behavior (26, 61, 65, 101, 102). Emotional or psychological factors are an integral part of TMJ dysfunction, particularly in the chronic patient (32, 88).

During the four decades since Costen (22) first described disorders of the temporomandibular joint and related structures, a central research theme has been controversy and confusion over the proper treatment (3, 4). This confusion related to the wide range of etiological factors hypothesized as the basic cause of the disorder, which ranged from postulated morphological to complex psychophysiological pathologies. There is a paucity of controlled experimental studies of treatment strategies (32, 38, 61, 88).

During the 1930's Costen, an otolaryngologist, described a group of symptoms—impaired hearing, dizziness, tinnitus, headache, dull pain, popping noise in the TMJ joint, and burning sensation of tongue and throat—that have become known as Costen's syndrome. His work influenced the dental profession to view TMJ as an occlusal dysfunction and to treat the problem by alteration of occlusion through the use of a variety of removable occlusal splints (87, 88) and/or alteration of the teeth by equilibration, rehabilitation, or orthodonic movement (60). However, comparisons of TMJ patients and normal subjects using EMG recordings of muscle activity and investigations of effects of natural and experimentally induced occlusal disharmonies, pre- and postequilibration muscle activity, and changes in symptomatology, have not shown that occlusal adjustment significantly alters TMJ dysfunction or the experience of pain (42, 52, 81, 105). The equivocal nature of the occlusal studies made many researchers and clinicians aware that TMJ disorders are quite complex.

The epidemiological studies of Schwartz and his colleagues at Columbia in the 1950's showed the limitations of a primarily occlusal approach to the etiology of TMJ dysfunction. These studies led to the conceptualization of TMJ disorders as a combination of both physiological and psychological factors (90, 91, 92, 93, 94). Schwartz's epidemiological study of over one thousand TMJ patients not only redefined the symptoms found in TMJ dysfunction, but also indicated the role played by stress and anxiety in the development of TMJ pain dysfunction. His colleagues, Moulton (71, 72, 73), who studied emotional factors in TMJ patients, and Kraus (50, 51), who studied muscle function in the same patient population, contributed to a conceptualization of TMJ dysfunction which emphasized the interaction of

emotional stress factors, personality variables, and muscular hyperactivity rather than occlusion in producing TMJ pain and dysfunction.

Laskin and his colleagues at the University of Illinois TMJ research center pursued similar lines of research. However, while Schwartz emphasized stress as the initiating factor, Laskin and his associates focused on the role of muscle spasm in TMJ dysfunction (39, 54, 55, 75a). They believe muscle spasm can be initiated through muscle overextension, overcontraction, or fatigue. Muscle fatigue produced by stress-reducing oral habits, such as clenching, bruxism, and lip or cheek biting, which involve a bracing of the lateral pterygoid muscle in a protrusive or latero-protrusive mandibular position is thought to be the most frequent cause of spasm and pain.

Attempts to explain TMJ dysfunction in purely psychological terms have traditionally used psychoanalytic, frustration-aggression, or learning theory frameworks. The psychoanalytic theories have hypothesized that TMJ patients suffer from deep psychological conflicts, usually sexual in nature, that result in hostile "biting" behavior. The TMJ dysfunction is often seen as a "conversion reaction" that allows the patient to express unconscious emotional conflicts. Moulton's (71, 72) work suggesting that sexual guilt is often found in TMJ patients is a prime example of this conceptualization.

Miller and Dollard's Frustration-Aggression hypothesis has been used (28, 95, 104) to explain TMJ dysfunction and particularly bruxism. The basic assumption is that because of personality characteristics, some individuals are prone to respond to frustration and/or aggression by clenching or grinding their teeth. Glaros and Rao (31), in their review of bruxism, indicate that there is some support for the notion that bruxists experience a significant level of interpersonal or situational stress that may contribute to their TMJ problems. Nevertheless, they caution that due to methodological difficulties with much of the research and some negative findings, e.g., bruxists do not differ from normals in levels of stress or anxiety (99), the importance of psychological factors is tentative.

The learning theory approach hypothesized that TMJ disorders are the result of learned habits involving muscle tension (6). Initially, increased masticatory muscle activity is a response to tension-evoking stimuli (interpersonal, situational, occupational, etc.). With repetition this muscle activity becomes conditioned or habitual and is no longer dependent on specific stimuli for elicitation. Since the clenching or bruxing may reduce tension or reduce pain (as in pressure anesthesia), the behavior is strongly reinforced and resistant to extinction.

Rugh and Solberg (88), in their excellent review of the psychological factors involved in temporomandibular pain and dysfunction, conclude that only a multifactorial approach to etiology can provide an understanding of

TMJ disorders. Further, as Glaros and Rao (32) caution, although psychological factors have an influence on TMJ disorders, the data do not support one psychological orientation or theory more than any other.

Since the focus of this chapter is on behavioral/psychological intervention, the many varieties of dentally, surgically, and pharmacologically oriented treatments for TMJ disorders will not be reviewed (51, 82, 83) other than to point out that a review of the treatment literature indicates that almost any treatment offered from the use of splints to psychotherapy has some success (61). Furthermore, the multiplicity of successful treatments described in the literature is viewed by some authorities (38, 61) as an indication of the lack of understanding of TMJ disorders. This lack of understanding and concomitant paucity of research on treatment may actually create TMJ patients, as individuals move from practitioner to practitioner seeking help and are subjected to a wide variety of treatment procedures. Greene and Laskin (40) and Greene and Markovic (42) have shown that TMJ patients are responsive to a wide range of therapies, including placebo. Based on these findings, the authors recommend that conservative approaches to treatment should be attempted before radical (surgical) treatment is considered.

Although conclusive evidence for one major cause of TMJ disorders is absent, a fairly consistent pattern of anxiety, pain, and muscular tension emerges. That these three components coexist in many TMJ patients does not necessarily imply that they are etiological factors; however, they are factors that may be amenable to a behaviorally based treatment. Before giving a description of the behavioral treatments that have been used, a brief discussion of these three factors is in order.

TMJ patients do not exhibit a personality pattern that differentiates them from normal individuals (88). They do, however, exhibit behaviors similar to people who tend to develop psychophysiological disorders such as low back pain (34, 59, 96). Further support for this observation was reported in a study by Evaskus and Laskin (25) in which greater urinary concentrations of catecholamines and 17-hydroxy steroids were found in TMJ patients than in control subjects.

The relationships among anxiety, fear, frustration, and increased muscle tension find wide experimental support in the psychological literature (29, 36, 60). Moulton (71) suggests that anxiety may induce autonomic reactions that will result in damage to the oral cavity by provoking muscular tension or oral habits such as bruxing. These habits may lead to muscular fatigue, tissue damage, and pain (25, 48, 55, 58, 69). It appears that TMJ patients not only react to stress with responses affecting the oral cavity, but also with a variety of psychophysiological responses. For example, Gold et al. (34) found that, compared to controls, 135 TMJ patients also complained significantly more often of low back pain, nervous stomach, had a higher incidence of ulcers and

asthma, and used more psychoactive drugs. The muscular hyperactivity found in TMJ patients has also been studied by comparing differences in EMG "silent periods" in the muscles of mastication between patients and nonpatients (11). Early findings indicated that TMJ patients had silent periods that ranged from 23–152 msec compared to 20–30 msec for normals. Initial suggestions that these differences might be of diagnostic and prognostic interest (11, 98) have not been supported by recent investigations (52).

The "response specificity" of TMJ patients, i.e., the relatively consistent patterns of physiological responses to stress, has been noted (16). That such patients respond to stress with increased muscular tension has been demonstrated in numerous studies (32, 88). Kydd (53) reported that TMJ patients, compared to control subjects, showed increased masseter muscle tension not only when exposed to emotionally laden material, but also when asked to exert pressure with their foot on a bar near the floor. Thomas (104) also showed that induced stress produced greater tension in the masseter muscles in TMJ patients than in non-TMJ patients. Further support for the stress-muscular tension relationship is found in a series of studies by Laskin and his associates (55, 67), who found that TMJ patients, compared to controls, exhibited increased jaw muscle activity when exposed to experimentally induced stress. Clinically, the majority, if not all, of TMJ patients exhibit chronic oral habits such as bruxism (43, 81). The usual consequences of these habits are muscular pain and tenderness (41).

The generalization of this relationship to natural settings has been studied by Solberg and Rugh (87, 88, 100). Portable EMG devices, which signalled when masseter muscular activity exceeded a set baseline, were worn by TMJ patients as they carried out their daily activities. The results of these studies suggest that stress situations, such as freeway driving, interpersonal conflicts, performance-oriented tasks, etc., increased bruxist and clenching behavior. Nocturnal bruxism also increased following daytime stress. The consistency between laboratory findings and the behavior exhibited by TMJ patients in the natural environment suggests that TMJ patients are prone to respond to stress with increased masseter muscular activity.

There is strong support for the general relationship between muscular hyperactivity and pain. Most authorities agree with Laskin (54) that masticatory muscle spasm is a primary factor responsible for TMJ pain. Research has demonstrated that TMJ pain symptoms can be induced in normal subjects by having them engage in bruxist behavior for up to 30 minutes. The ensuing pain lasts from one to seven days (24, 86, 105). Pain is the most common of all the TMJ symptoms and it is experienced by approximately 90% of patients (3). The treatment of the pain is the most compelling problem for the clinician. A wide range of dentally oriented

therapies has attempted to directly relieve TMJ pain, e.g., ethyl chloride spray, tetanizing, and sinusoidal current, hot packs (4, 51), etc. If pain persists, surgical or pharmacological intervention is frequently initiated (47). Often as a last resort, many patients are referred for psychological treatment, such as psychotherapy, reflex relaxation exercises (93), relaxation training (31), mass practice therapy, or biofeedback (5, 30).

In recent years chronic pain, such as that experienced by TMJ patients, has been considered as important clinically as the disease or illness which initially prompted the pain (13). The focus on chronic pain behaviors by Sternbach (101, 102) and Fordyce (26), combined with the gate-control theories of pain by Melzack and Wall (66), has influenced recent thinking concerning the treatment of TMJ patients. As Frost (29) and Pilling (79) have indicated, the psychological component is often of prime importance for treatment. The clinician must recognize that TMJ patients may continue to have pain despite multiple attempts to treat suspected pathological conditions. In fact, as Marbach cautioned, attempts to treat suspected organic pathologies or oral habits by clinicians have produced "a group of patient-casualties because each doctor tended to treat the patient in the method familiar to him and this method was not necessarily the appropriate one" (61, p. 34). Rugh and Solberg (88) suggest that treatment should deal less with finding the cause of the pain and more with providing patients with skills and means to cope with their pain and have productive lives. Considering the importance of the emotional component in TMJ pain, it is surprising that few studies involving systematic desensitization or assertiveness training have appeared in the literature.

Biofeedback is based on Miller's (68) work showing that animals can learn to control visceral and somatic responses, and on Basmajian's (9) success in teaching subjects to control the action of a single motor neuron. Subjects learned to fire a single neuron while suppressing the activity of the associated neighboring neuromuscular units. Ability to control the single neuron persisted after feedback was eliminated. Electromyographic (EMG) biofeedback consists of measuring the electrical activity of a patient's muscle and providing him with information concerning this muscle activity by visual, auditory, or other forms of feedback. The patient is expected to increase or decrease muscular activity on demand. Biofeedback for voluntary muscle control has had widespread application in the research and treatment of TMJ disorders (13).

Different therapeutic approaches may lead to treatments that are differentially effective with respect to the systems they attempt to modify. Therefore, in reviewing EMG biofeedback and relaxation studies, one would expect to find the greatest changes in patients who have the highest resting levels of EMG activity (15). It may be important to look more closely at the distinction between TMJ patients with organic pathology that increases masseter muscle tension and other patients. In this latter group, emotional

precipitants may play a larger role, and an approach such as systematic desensitization or assertiveness training, which helps interpersonal anxiety or skills deficits, may lead to more satisfactory results. Indirect support for this assumption comes from Gessel and Alderman's (31) and Mealiea's (63) findings that relaxation and biofeedback procedures were least successful in patients with prominent psychological symptoms such as depression.

Since increased muscular tension is frequently associated with TMJ dysfunction, the use of biofeedback as a treatment has strong face validity. Budzynski and Stoyva (14) trained normal subjects to decrease the EMG activity of their masseter muscles. Audio and visual feedback of masseter activity were equally effective in the reduction of muscular tension; by contrast, a bogus feedback group and a no-feedback group did not have a reduction in masseter activity. The relationship between muscular hyperactivity and TMJ pain has led to the use of treatment procedures based on relaxation training. Schwartz and Chayes (93) developed reflex relaxation training in which the patient performs exercises that exert pressure against the muscles of mastication, then relaxes the muscles. The repeated sequence of pressure-relaxation is thought to teach the patient how to relax his muscles and thereby decrease pain. Gessel and Alderman (31) attempted to teach TMJ patients a relaxation procedure based on Jacobson's progressive relaxation, which they call "tension control training." The disadvantage of these approaches to relaxation training is the number of trials it takes for the patient to learn the procedure without feedback about tension levels.

A number of authors have attempted to use EMG biofeedback to treat TMJ pain. Table 1 summarizes the results of these studies. The outcome of this type of treatment has been consistently positive, except for experiments by Dohrmann and Laskin (23) and a single-subject reversal experiment by Rugh and Solberg (87). However, the majority of the published data is from case studies in which TMJ patients were given EMG biofeedback training for one-half hour once or twice a week for an average of ten sessions. The major exception to this procedure is the work of Solberg and Rugh (100) and Rugh and Solberg (87), in which patients wore a portable EMG feedback unit during their day which signalled them when a set EMG level was exceeded; and Clarke and Kardachi's (21) study, where the EMG apparatus was worn during sleep.

SUMMARY OF FINDINGS AND FUTURE IMPLICATION FOR TREATMENT OF TMJ

Biofeedback Training

The major shortcoming of case reports, whether they use only 1 patient or 23 as in Gessel's (30) study, is that one cannot decide what independent

TABLE 1
Biofeedback Treatment of TMJ Pain Summary of Outcome Studies

	Clients					*Biofeedback*			*Research Design*	
							Sessions			
Investigators	*N*	*Sex*	*Age*	*Referral Problem*	*Feedback Mode*	*Procedures*[a]	*Length*	*Freq.*	*N*	*Outcome and Notes*
Carlsson, Gale & Ohman	1	F	21	TMJ Pain	Meter (Analog)	Detailed lab training in awareness, control and relaxation of masseter. "Homework" assigned	?	1–2/wk.	18	Case report, In-session EMG, control good. No pain after 10th session. No pain at 6 mos. (Pt. report).
Carlsson & Gale	1	F	59	TMJ Pain	Meter (Analog)	See Carlsson et al. (1976) above	?	?	9?	Case report, In-session EMG, control good. No pain after trtmt. No pain at 12 mos. (Pt. Report).
Carlsson & Gale	11	6M 5F	21–61	TMJ Pain	Meter (Analog)	See Carlsson et al. (1976) above	?	2/wk.	6–18	Case report. 8 of 11 showed improvement with 5 of 11 symptom-free for one year. No relationship between outcome and performance during training.
Clarke & Kardachi	7	2M 5F	?	TMJ Pain	"Auditory" Variable-Tone (Analog)	EMG feedback at night during sleep	?	?	2–10	Case report. 4 of 7 patients report significant decrease in pain. No follow-up reported.
Dohrmann & Laskin	24	16M 8F	?	MPD Syndrome	"Auditory"	Lab training (Details lacking in abstract). EMG Group (N = 16), Placebo (N = 8).	30′	2/wk.	12	Group experiment. 12 of 16 (75%) "Required no further trtmt." ("Evaluated by naive observer") Placebo 50% improved.

Gessel	23	22F 1M	?	MPD Syndrome	Variable-Pitch Tone (Analog)	Lab training, *S* simply told to lower tone. (?)	30′	1–2 (M = s)	3–14	Case report. *S* terminated if no better by session 6. "Satisfactory control of symptoms" in 15 of 23 (65.2%) (Pt. report?)
Olson	15	?	?	MPD Syndrome	Auditory	3 Groups: (1) Masseter EMG feedback (N = 5) (2) Frontalis feedback (N = 4) (3) Frontalis feedback plus psychotherapy (N = 6).	?	?	12	All groups decreased muscle tension. Group 1 decreased pain but not as much as Group 3. N for each group too small for cross group comparison
Peck & Kraft	6	F	13–31	TMJ Pain	Auditory Meter (Analog)	Lab training, *S* instructed to lower tone and meter.	30′	2/wk.	10	Case report. 2 of 6 showed some improvement However, Pts. were long-term chronic TMJ patients who had not responded to other forms of therapy.
Rugh & Solberg	1	?	?	?	Tone when EMG exceeded set level	EMG exceeding set level wakes patient.	All night?	Nightly	10	Single-*S* reversal experiment. Reduction in super-set level EMG during treatment, none thereafter.
Solberg & Rugh	15	?	?	"TMJ Pts."	See Rugh & Solberg	*S* wore device during day, tone sounding when EMG exceeded set level. Training in relaxation also provided	All day?	Daily?	2–7	10 of 15 (66.7%) "significantly" improved. (Pt. report & "clinical" exam)

[a]All used Masseter EMG feedback unless otherwise noted.

variables initiated the change in the patient's behavior. This is particularly relevant when they are compared with studies which have shown placebo treatment to modify symptoms effectively (37, 55, 97). Dohrmann and Laskin's (23) study found that EMG biofeedback is more effective in reducing muscular tension and decreasing pain responses than is a placebo. However, because of the small number of subjects in each group, the results are only suggestive. The same limitation applies to Olson's (74) work. His conclusion that a combination of EMG biofeedback and psychotherapy is more effective for retractable TMJ patients than EMG biofeedback alone is provocative. The findings are consistent with Phillips' (78) discussion of the complexity of pain and explanation why training a patient to respond to only one symptom, like muscular tension, may not be sufficient for meaningful overall change. However, Olson's conclusions are based on the behavior of two out of five patients in the biofeedback/therapy group and one of five patients in the biofeedback-alone group. The small number of subjects makes any conclusions tentative, at best. Therefore, at the present time, the efficacy of EMG biofeedback, compared to other forms of therapy in treating TMJ disorders, is still open to empirical verification.

Intraoral Discrimination Training

Since the TMJ patient focuses his attention on proprioceptive cues, perception of pain depends on how an individual interprets the sensations he perceives. Stress, anxiety, and depression influence whether or not a given stimulus is perceived as painful (10, 77). The TMJ patient focuses a great deal of attention on the proprioceptive cues he receives from his oral and facial area. How these sensations are perceived, interpreted, and responded to may be important to understanding TMJ disorders. An expansion of the work on intraoral perception (106) may indicate whether or not TMJ patients perceive *interoral* cues differentially, that is, are TMJ patients hypersensitive to jaw position and to pressure applied to their teeth, or do they lack the ability to make accurate discriminations concerning mandibular kinesthesia? If so, it may be possible to program discrimination learning or to decrease the TMJ patients' hyperresponsiveness.

Assertiveness Training

A review of the literature indicates that TMJ individuals who have difficulty expressing frustration and aggression often have anxiety that may lead to excessive tension or depression. In the TMJ patient this may manifest itself primarily in the masseter muscles of the jaw. Whether or not the inability to express anger appropriately or the depression is causal or secondary to the TMJ syndrome, these presenting problems have been successfully treated. Wolpe and Lazarus (107) described a broad group of therapeutic procedures,

referred to as assertiveness training, which have demonstrated the ability to improve the social skills of the individuals who typically tend to inhibit appropriate behavior in interpersonal relations: "In many cases this unexpressed impulse continues to reverberate and... these persistent discharges produce somatic symptoms and even pathological changes in predisposed organs" (107). Hersen and Eisler (46) documented a wide variety of studies in which assertiveness training was successfully employed to treat depression and anxiety-related interpersonal disorders. Although it is a procedure justified by the dynamics postulated to contribute to the TMJ syndrome, there are no studies in the literature at the present time which assess its effectiveness.

BRUXISM

Bruxism, a nonfunctional gnashing and grinding of the teeth, is second only to pain as a major symptom of TMJ dysfunction. Bruxism is also found independently of TMJ pain in large numbers of children and adults and it occurs cross-culturally and in all social and economic situations (57, 86). Prolonged bruxing may result in abnormal tooth wear, occlusal alterations, injury to the periodontal ligament and periodontium, hypertrophy of the masseters, pain, alveolar bone loss, and eventual loss of teeth (33, 83). The application of behavior modification techniques to bruxing behavior is necessitated because of the high incidence of bruxism (20% of dental patients) (64, 84); the relative ineffectiveness of traditional dental treatments such as splinting and occlusal adjustments; and the recognition of a significant psychological or behavioral component (32, 88). Habitual bruxing behavior has been treated by the following behavioral techniques.

Massed Practice

Ayer and his associates (5, 6, 7, 8) have applied a procedure similar to Dunlap's negative practice. The patient is required to practice bruxing for five-second intervals with five seconds of rest for five trials per treatment block repeated six times a day for two weeks. In a series of case reports, Ayer and Levin (8) indicated that of 33 bruxists (20 females and 13 males) at one-month and one-year follow-up, 25 reported a cessation of bruxing behavior. Although provocative, his work is only suggestive because, other than subjective reports, no actual measures of bruxing behavior were made and no attempt at experimental control for expectation or other nonspecific treatment effects was conducted.

An attempt to replicate the above findings and control for expectancy effects found that bruxists in a mass-practice treatment group (N = 9) did not

differ from a no-treatment control group (N = 8) (44). Rather than rely on subject reports of bruxing behavior, Heller and Forgione measured bruxing directly. A four-color laminated plastic mouth plate called Bruxcore with microdots printed on the uppermost surface in a pattern with 14,400 dots per square inch was used to measure nocturnal bruxing directly. When the mouth plate was ground down by the teeth, a measure of grinding activity was obtained by looking at the number of microdots worn away and the different-colored layers of laminated plastic exposed. The data indicated that nocturnal bruxing varies widely from night to night and, significantly, that massed practice did not decrease but actually increased nocturnal bruxing (27). Until the efficacy of massed practice is more broadly researched, one should view its general application in treatment cautiously.

Tension Reduction

Stress-induced masticatory muscle activity is considered a significant contributor to bruxism, and research has shown that daily stress-evoking events lead to an increase in nocturnal bruxing (32, 88). There have been numerous attempts to decrease tension in the bruxist patient by developing the depressor muscles (1), practicing keeping the lips together and teeth apart (103), hypnosis (35), using tranquilizing drugs (20), and training in relaxation (44). However, except for Heller and Forgione's (44) study on progressive relaxation, these techniques have not been subjected to experimental clinical tests. These authors compared progressive relaxation (N = 6) with mass practice (N = 9) and a no-treatment condition (N = 8). No differences in bruxism, as measured by the Bruxcore bite plate, were apparent between treatment and control groups.

Solberg and Rugh (100) developed a portable EMG device which could be worn by a patient and provide him information about his masseter muscle activity continuously. The basic assumption is that, since the majority of bruxing patients are unaware of their habit (70), a portable EMG biofeedback device would signal them, via an ear plug, when tension levels exceeded baseline levels. The patient would then be able to make a competing response, such as relaxation, which would inhibit or reduce the tension. Fifteen subjects wore the EMG unit for two to seven days. Ten subjects reported that they became more aware of their bruxing behavior and were able to relax their masseter muscles even when the EMG unit was not worn. The results were primarily based on subjective reports and no follow-up data were provided.

Avoidance Conditioning

Nocturnal bruxism is highly resistant to change because it is not under conscious control. Bruxism occurs during slow-wave sleep (Stage 3–4, EEG

cycles of 4–6 per sec), with each episode of increased masticatory activity lasting an average of 9 seconds, with a range from 3 to 66 seconds (80, 85). Bruxism coincides with slow ocular movements, and each episode is followed by a lighter phase of sleep (Stage I) (89). Aversive conditioning procedures, which have been highly successful in treating enuresis, have been applied to the treatment of nocturnal bruxism. Heller and Strang (45) monitored audible grinding noises during patient's sleep. After establishing a baseline rate of grinding, three grinds per five-second period, they administered a noxious sound to the patient through earphones for three seconds. The sound was not loud enough to wake the patient, but it was sufficient to produce a decrease in grinding over seven treatment sessions. During treatment the rate decreased from 1.75 grinds per minute to 0.65 grinds per minute. Cessation of the aversive stimulus caused an increase in rate of tooth grinding. The study does not indicate what long-term effect, if any, the treatment had on bruxism or whether high-intensity grinds were replaced with low-intensity grinds. Forgione's (27) work indicated that the use of aversive stimuli contingent upon grinding noise level simply results in the patient's being conditioned to produce low-level grinding responses rather than ceasing to brux.

Kardachi and Clarke (49) report a case study of nine bruxists (six males, three females), in which nocturnal EMG activity of the masseter and temporalis muscles was monitored. Baseline recordings of bruxing activity were made for an average of seven nights, following which sound feedback of masseter muscle activity was initiated. The sleeping subjects were administered, via an earpiece, an audible tone that varied in frequency with the intensity of their muscle activity. Six of the nine subjects showed a decrease in bruxing activity in terms of duration and intensity; however, there were no reductions in frequency of bruxing episodes during sleep, nor were any follow-up data concerning the potential clinical effectiveness of treatment provided. At present, the data suggest that avoidance conditioning techniques can modify nocturnal bruxing intensity and duration. However, whether the change persists over time or is of clinical significance is still open to empirical test.

SUMMARY AND CONCLUSIONS

There is a growing body of literature which strongly suggests that behavioral strategies have been successfully applied to pain-related problems in dentistry. The practical findings that biofeedback, massed practice, tension reduction, and aversive conditioning procedures have led to a reduction in symptomatology in itself justifies further use of behavioral treatment strategies. However, the application of behavioral technology in the treatment of TMJ and bruxism has been haphazard. There are few controlled studies comparing the effectiveness of these procedures with more traditional

dental, rehabilitative, or psychotherapeutic techniques. Appropriate control groups have seldom been used in this experimental literature.

The heterogeneity of the population of patients with TMJ or bruxism is clearly a factor that needs to be further analyzed. In many studies no attempt is made to differentiate chronic intractable pain patients, previous treatment approaches, or personality characteristics. This increases the variability of the sample and weakens the evaluation of a treatment's effectiveness. For instance, it has been demonstrated that those patients with chronic depression associated with the pain syndrome respond less well to any type of intervention. It seems plausible that distinguishing organic dysfunctions from nonorganic problems might enhance prediction of treatment outcome. Those patients with higher levels of EMG activity or reactivity might benefit more from biofeedback muscle tension control procedures.

There has been serious neglect of operant approaches with this population. Fordyce (26) and Sternbach (102) have demonstrated the effectiveness of restructuring environmental and family reinforcement patterns in the rehabilitation of chronic pain patients. TMJ patients have much in common with chronic pain patients; they typically have many somatic and psychophysiological complaints and depressive episodes. The secondary gains of receiving compensation and sympathetic attention by medical and family contacts are also present. The interpersonal aspects of these patients, including family-role status and ability to express feelings, have not been treated within a behavioral framework. Assertiveness training, cognitive restructuring, and self-control procedures may help as stress-management techniques.

The methodology that will allow an objective quantification of treatment is rapidly growing. With the advanced technology of radiographic examinations, dentists can give us a picture of actual pathological change in the temporomandibular joint. Forgione's Bruxcore allows for quantification of intensity of bruxing behavior. The advent of portable EMG biofeedback devices, in addition to the wide availability of multichannel polygraphs, provides a permanent record of treatment process and outcome. This also helps the therapist to make a thorough functional analysis of psychological stressors in the natural environment and to correlate masseter muscle tension with rest and daily activity and evaluate the patient for biofeedback treatment.

Measurement instruments can be used more effectively to provide information about the process and maintenance of change. Verbal reports of intensity and duration of pain should be considered along with the somatic and behavioral components of the individual patient.

The treatment of TMJ and bruxism needs further investigation. At the present time, it is most parsimonious to conclude that a multifaceted approach, including reduction of EMG tension levels, pinpointing

precipitants of stress, and dental equilibration procedures would be warranted prior to a radical surgical intervention. The tools are available, the patients seek treatment, the objectives are clear. The research awaits only the ingenuity and motivation of the investigator. This population provides a potent arena to evaluate our behavior treatment strategies.

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The Comprehensive Handbook of Behavioral Medicine, Volume 2

Introduction to Skin Disorders

The skin is the largest organ system of the human body and one of the systems most commonly affected by disease processes. In almost all cases, disordered function results in a subjective symptom such as itching, burning, and warmth. Although many disease entities can be diagnosed and etiological agents such as viruses, funguses, and metabolic disturbances specified, in most cases the etiology is uncertain—for example, in psoriasis, eczema, and the neurodermatoses. Both diseases with a clear organic etiology, and those with a possible functional basis are often complicated by habitual behaviors, the most common of which is scratching. These behaviors may worsen or cause pathological changes in the skin which lead to further maladaptive behaviors: Scratching leads to inflammation which leads to itching and more scratching. These pathological changes vary from excoriation caused by excess scratching, to extensive dermal thickening, lichenification, and scarring in addition to exposing the organism to the constant threat of infection and the psychological consequences of disfigurement. In addition to diseases with organic causes, there are many disturbances of the integument which are psychological in origin. These vary from habits like nailbiting and hairpulling to some of the more destructive, self-mutilatory syndromes of childhood.

In the first chapter of this section the authors review the psychosomatic literature that deals with functional dermatological diseases. Although these disorders are common and often very chronic, traditional psychological treatments for them have been largely ineffective. Psychopharmacological investigations, on the other hand, have proved efficacious; and it is unclear why psychotherapeutic interventions which treat the same problem have not been useful.

There are many single case reports in the literature of positive outcome when individuals with functional dermatoses are treated with behavior therapies, but almost no systematic behavioral intervention studies. The reason for this lack of investigational literature is unclear. There is a therapeutic need, and behavior therapy should be effective. In addition,

patients with these disorders could potentially provide a valuable model system for testing behavioral strategies in medical disorders. Unlike stress which is subjective, and hypertension which may be labile, one can easily measure square centimeters of pathological involvement, and correlate this with treatment variables. The end points of treatment are often quite clear.

The second paper in this section describes a clinical treatment program for a common habit disorder, nailbiting. Although outcome data are not available for this program, it stands alone as a systematic behavioral intervention for a habit disorder involving the integument. As with the literature reviewed in the first paper, there is a drastic need for replication and extension of the initial work.

The Comprehensive Handbook of Behavioral Medicine, Volume 2

CHAPTER 14
Behavioral Treatment of Skin Disorders

Craig Risch
James Ferguson

The integument is subject to many disease processes that have a subjective or emotional component, such as pain, itching, and erythema. Many habitual behaviors and tics such as nailbiting and scratching also impinge on the integument, and many emotional states are expressed through the skin, such as blushing and sweating. A rich afferent innervation from a variety of cutaneous organs which detect touch, cold, heat, and pressure, and an efferent network of sympathetic and parasympathetic fibers mediate responses to environmental and emotional stimuli.

When discussing disorders of the skin, it is necessary to differentiate between organic and functional disorders, and to differentiate the secondary effects of maladaptive behaviors, such as scratching, which almost invariably make organic lesions worse. From a theoretical standpoint, many of the functional dermatoses and behaviorally worsened lesions can be conceptualized as behaviors that are maintained by negative reinforcement. A behavior, usually scratching, immediately but temporarily terminates an aversive stimulus such as the sensation of itching or burning. At the same time, the behavior of scratching may attract attention, or be socially reinforced. The behavior learned in this way should be treatable by response prevention. The result of this treatment should be a temporary increase in the severity of the symptom, followed by a gradual extinction of the response. The lesion should heal without scratching, and hopefully any positive reinforcement can be redirected to alternative nonscratching behaviors which will also lead to a decrease in the intensity of the aversive stimulus. The original symptom can vary from an environmental insult such as an allergic

response to a behavioral response to an emotional stimulus. In theory the stimulus need only persist until the integument is damaged. After this the normal process of healing can provide the aversive stimuli of itching and pain. Although this is a somewhat simplistic formulation of neurodermatoses, it provides an experimental framework for looking at these disorders.

When reviewing the literature, the virtual absence of published psychological intervention strategies is striking. The few studies available suggest that this may be due to the unpredictable and at times marginal benefits of traditional psychotherapies and psychotherapeutic medications for these disorders. More recently, behavior therapy has appeared to offer a new approach. Case reports are available reporting rapid cures with lasting treatment results. These positive case reports await confirmation by controlled studies.

This chapter will discuss disorders of the integument for which behavioral treatment has been reported. These disorders include neurodermatitis, urticaria, dyshidrotic eczema, psoriasis, symptomatic erythema, atopic dermatitis, and trichotillomania. These behavioral treatment results will be contrasted with the results obtained by the use of traditional psychodynamic psychotherapy and psychotropic medication.

NEURODERMATITIS AND OTHER PSYCHOSOMATIC DERMATOSES

Neurodermatitis is characterized by pruritus, erythema, and papules which are believed to have an emotional etiology. These primary symptoms are complicated secondarily by scratching, which produces abrasions, lichenification, and scaling. In any specific case, the diagnosis of neurodermatitis with its emotional etiology is a diagnosis of exclusion. The exact incidence of neurodermatitis in the general population is unknown. Wittkower (40) reviewed 17,605 initial outpatient visits to St. John's Hospital for Diseases of the Skin in 1949, and reported that 45.2% had skin conditions in which emotional factors were believed to be important, 16% were diagnosed as "neurodermatoses" (i.e., idiopathic pruritis—general and localized—neurotic excoriations, neurodermatitis, dyshidrosis, idiopathic chronic urticaria, alopecia, lichen planus, vitiligo, and rosacea), and 2.4% "neurodermatitis" per se.

Patients with neurodermatitis might reasonably be expected to share a common psychological profile which might be demonstrable by psychometric testing. Allerhand et al. (2) reported a "Neurodermatitis Scale" which distinguished patients with neurodermatitis from patients with other dermatological disorders and from general medical patients. Patients with neurodermatitis were found to be significantly more "restless with difficulty

relaxing, impatient, irritable, easily frustrated, interpersonally brusque, self-reliant, and confident in their own strength and vitality." However, Kidd and Watt (23) were unable to distinguish between patients with organic and psychosomatic skin disease by clinical or psychometric indices of "emotional dysfunction." They report that the amount of "emotional dysfunction" was increased for all dermatology patients compared with a control population without skin disease. From these studies, it appears that patients with a dermatological disorder of any kind share an increased incidence of emotional dysfunction when compared to individuals without skin disease.

Psychodynamic interpretations of the pathogenesis and symbolism of neurodermatitis vary considerably from author to author. The signs and symptoms are thought to represent threats to life and existence, threats of loss of an outside source of support, blows to self-esteem, or conflicts over sex and aggressiveness (40), a reflection of basic human emotions, including a need for love, anxiety, hostility, inferiority feelings, ambivalence, guilt, ambition, and envy (12), and self-punishment, self-denial, self-castration, and self-destruction (42). Psychodynamically oriented psychotherapeutic treatments for emotionally mediated neurodermatitis and skin disorders have had mixed results. Seitz (33) reported an uncontrolled study of brief psychotherapy in the treatment of 25 patients with neurodermatitis and "neurotic excoriations." At one-year follow-up, 19 of the original 25 patients were considered "therapeutic failures." Although some patients had clearly benefited, many had dropped out of treatment, and a few had experienced a worsening of their skin disease. Cormia (8) published an uncontrolled study of the psychotherapeutic treatment of 85 patients with a wide variety of "psychosomatic dermatoses." Treatment was aimed at "development of insight into the nature of the presenting problem, a constructive readjustment to life, and the modification of that part of the environment which contributed to the development of psychic trauma." Follow-up at one to 36 months (average six months) showed symptomatic improvement or cure in 29.4%, symptomatic improvement in 27%, and outright failure in 43.6%. Brown and Bettley (6) report a controlled study of the psychotherapeutic treatment of eczema in 72 patients. Patients were randomly allocated into two groups. One group received medical treatment only, whereas the other group received the same medical treatment plus four months of psychotherapy. Psychiatric treatment was multimodal. It stressed development of the patient's awareness by affective ventilation, and verbalization of emotional disturbance, expression and brief focal psychotherapy. In addition, it included hypnosis, relaxation therapy, and where indicated, antidepressants, tranquilizers, and hypnotics. Seventy-nine percent of the patients were seen at 18 months' follow-up. The authors report: "In the presence of overt emotional disturbance, of new psychological and psychophysiological symptoms preceding the rash by up to a year, and of a high motivation for it, brief

psychiatric treatment improves the outcome of eczema (the proportion at eighteen months was almost doubled), whereas in their absence such treatment may worsen it, especially in the short term."

A variety of psychopharmacological agents have been used to treat "psychosomatic dermatoses." Lester et al. (24) report a double-blind investigation of chlorpromazine, imipramine, meprobamate, chlordiazepoxide, and inactive placebo medication in a noncrossover design study in 85 patients with "psychosomatic dermatoses" (atopic dermatitis, seborrheic dermatitis, psoriasis, and hyperhidrosis). At the follow-up examination after one to 20 months of treatment, they concluded that psychotropic drugs as a whole led to improvement in 50% of the patients treated. Thirty percent of patients improved with placebo treatment alone. The authors found no significant differences in effectiveness for the different medications. Levy (26) studied diazepam (dosage 2.5–10 mg/day over two to 17 weeks) in 151 patients with dermatological disorders where emotional disturbances were considered to be a major causative or aggravating factor. Diazepam was given along with standard topical therapies, without any attempt to provide formal or interpretative psychotherapy. The author felt that diazepam was useful in the management of skin disorders in 136 patients (90%), with fair results in eight patients (5.3%), and with poor results in only seven (4.7%). Friedman et al. (15) reported a controlled study of the efficacy of monoamine oxidase inhibitors in the treatment of neurodermatitis. Fifteen randomly assigned subjects (eight experimental, seven control, matched for age, sex, and duration of illness with a mean duration of 18.6 years) were all given phenelzine sulfate (30 mg/day, a subtherapeutic dose in most people) for five weeks. In a double-blind experiment, the subjects were then given either phenelzine sulfate 75 mg/day or diazepam 25 mg/day. The investigators used a four-point scale (0 = asymptomatic to 4 = maximum severity) to rate blindly the patient's symptoms of pruritis, erythema, papules, lichenification, and scaling weekly throughout the experiment. They found no significant improvement in the subjects during the first five weeks on phenelzine 30 mg/day. During the following five weeks the subjects receiving diazepam improved slightly while the subjects receiving phenelzine 75 mg/day showed a statistically significant improvement in all areas except scaling, compared to their baseline symptom score. This group also was significantly more improved than the control group (26). Four of the patients became symptom-free when the phenelzine treatment was continued (16).

In contrast to the relatively controlled studies of psychotherapeutic and psychopharmacologic interventions in the dermatoses, the behavioral literature is limited to case reports. There are seven case studies reporting the use of behavior therapy techniques in the treatment of neurodermatitis and compulsive scratching. In most cases, the patient had suffered from neurodermatitis for years, and had received a variety of somatic,

psychotherapeutic, and psychopharmacologic treatments without results prior to the behavioral instruction. In all the cases reported, the neurodermatitis was complicatd by the patient's scratching, which often resulted in chronic sores, scabs, and infections. In each case report, only behavior therapy techniques were used in the treatment. The patient was seen once weekly for 3 to 13 sessions. All cases reported a total remission of the neurodermatitis with a cessation of scratching, and clear skin without scabs or scars at follow-up examinations, which were from months to four years after treatment.

The behavioral treatments were tailored to each patient's situation and varied among studies. A combination of operant conditioning techniques was used, including positive reinforcement, negative reinforcement, and aversive conditioning, sometimes with relaxation therapy and systematic desensitization. In each case, the patient's scratching was the target behavior. The first session was spent taking a history, and the first week was used to record a baseline frequency of scratching. When feasible, these baseline observations were confirmed by the therapist or another observer such as a family member. The frequency of scratching was recorded throughout the treatment period.

In one case (37), the therapist noted that the patient's scratching was reinforced by the attention of her family and fiancé. The therapist instructed the family and fiancé to ignore the patient's scratching. With only this limited intervention, the patient's scratching stopped within two months, her skin was clear at three months, and remained so at four-year follow-up. Two similar cases (1, 4), both young children, were treated by having parents and schoolteachers ignore the patient's scratching and reinforce the patient with small presents for days and nights when no scratching occurred. In each case, scratching was eliminated and the patient's skin was clear at six weeks (four-month follow-up reported) (1) and thirteen weeks (18-month follow-up reported) (4) after treatment was started, and remained so on follow-up. In two other cases (4, 31), the patient was given a small electric shock (lmA) by the therapist each time he was observed scratching. The shock was terminated when the patient stopped scratching and said "don't scratch." These patients were also trained in progressive relaxation. In both cases, scratching was eliminated within five weeks. Their skin quickly cleared and they remained asymptomatic at follow-up 13 and 5 months respectively. Another case (38) was treated by self-control techniques. Initially, the patient suppressed the urge to scratch by substituting behaviors incompatible with scratching, e.g., "stroking" instead of scratching, then patting instead of stroking. She also reinforced herself with favorite activities for periods when she suppressed all scratching. Within three weeks, the patient's scratching, itching, and rash were eliminated and she remained symptom-free at 18-month follow-up. A final study (10) reports treating of hives which were unresponsive to allergy

injections and a variety of antihistamines and psychotropic medications. In this patient, the hives were exacerbated by anxiety-provoking situations. After training in deep muscle relaxation, the patient and the therapist constructed a series of anxiety hierarchies. While in a state of deep relaxation, the patient imagined anxiety-provoking scenes. During therapy, she was taught the patients to control their skin conductance by using a biofeedback were eliminated within 12 weeks and had not recurred at two-year follow-up.

The literature contains five cases (4, 29) of hyperhidrosis treated by behavior therapy techniques. One case (4) was a 19-year-old woman with a long history of severe palmar hyperhidrosis which interfered with her work and social life. The therapist hypothesized that her skin disorder reinforced her shyness and insecurity. She was treated with systematic desensitization focusing on social interactions, and with assertiveness training. Within several weeks, her sweat gland activity had diminished considerably. At one-year follow-up she was asymptomatic and socially active. Miller et al. (29) successfully treated dyshidrotic eczema in two of four patients by using biofeedback. They observed that the eczema in these patients was related to increased epidermal hydration and high skin conductivity. In therapy, they taught the patients to control their skin conductants by using a biofeedback device that produced a tone which changed as their skin conductance changed. Patients were instructed to lower the tone using any cognitive strategies that worked. Once they had learned this, they were asked to practice with the biofeedback device a minimum of one-half hour per day. Two patients refused to practice the technique and their eczema remained the same or worsened. The two patients who practiced the technique regularly were free of eczematous lesions within four weeks, although their hyperhidrosis persisted. At follow-up, the patients who continued to practice their biofeedback were free of eczema.

Two reports (14, 39) describe the use of behavior therapy with traditional insight-oriented psychotherapy in the treatment of psoriasis. Waxman (39) reports the use of a variety of techniques to cure a 38-year-old female of her psoriasis of 20 years. These included: 1) relaxation under hypnosis, 2) "hypnoanalysis" or insight-oriented psychotherapy under hypnosis, 3) counterconditioning or systematic desensitization of anxiety-provoking situations, 4) "practical retraining" during which the patient experienced *in vivo* the anxiety-provoking situations she had imagined in her systematic desensitization, 5) assertiveness training, and 6) self-hypnosis. This patient was asymptomatic without rash after 15 weekly sessions. These results were maintained at ten-month follow-up. Frankel and Misch (14) report "marked improvement in psoriatic lesions" in a 37-year-old schoolteacher who had a 20 -year history of psoriasis. The patient, who was "socially withdrawn and pathologically sensitive to public opinion," had been in psychotherapy for three years. During a hypnotic trance, he was taught to replicate the feelings

in his skin that he experienced while sunbathing, an activity that had always been somewhat beneficial for his psoriasis in the past. He was then taught self-hypnosis, which he practiced for a few minutes five or six times a day. Within a few weeks his psoriasis was improved, and it continued to improve over the next year although it never completely remitted. As the psoriasis improved, the patient was able to work more effectively in psychotherapy and his occupational and social relations improved considerably.

There are two reports (4, 17) in the literature of the use of behavior therapy in the successful treatment of "symptomatic erythema" or chronic pathological blushing. Both patients complained of chronic blushing for many years which interfered with their social and occupational relations. Each patient was felt to be socially inhibited and afraid to express his feelings. They were treated by relaxation therapy and assertiveness training. Both patients stopped their inappropriate blushing after less than a month of treatment, and both were judged by themselves and their therapists to have made substantial improvement in their social and occupational relations. At six-month follow-up, they were judged to be free of social anxiety, self-confident, and skillful in coping with interpersonal situations.

In summary, a variety of "psychosomatic dermatoses" of long-standing duration which were resistant to many types of therapeutic interventions were significantly improved and often "cured" by the use of behavioral treatments. In many of the case reports, a variety of behavioral techniques was used simultaneously, and the combination apppeared to be tailored to the individual's specific needs. These outcome data suggest that behavior therapy is sufficiently useful in these difficult illnesses to warrant controlled outcome studies.

TRICHOTILLOMANIA

Trichotillomania is a rare dermatologic disorder first described by Hallopeau in 1889 (20). It is characterized by an irresistible urge to pull one's hair and a resulting alopecia. It most commonly involves the scalp and eyebrows, but occasionally extends to eyelashes, axillary, and pubic hair. The exact incidence of trichotillomania is unknown; however, it is a very uncommon disorder (18, 27) that probably occurs more commonly in adults than in children, and more commonly in women than in men. The psychoanalytic literature ascribes a variety of causes and symbolic meanings to trichotillomania. For example, some investigators (9, 18, 19) feel the patients usually have an ambivalent, double-binding, domineering mother with strong unsatisfied dependency needs who is married to a passive, aloof, inadequate, helpless man. They further describe a hairpulling symbiosis between the mother and adolescent daughters with trichotillomania. Another

author (22) reports that a main dynamic component of the symptom is the loss of an ambivalently cathected oedipal object and turning of castration impulses toward the self. Zaidens variously describes trichotillomania as derived from the sensual pleasure associated with infantile nursing, from corporal punishment where incorporation occurs as a manifestation of identification, through frustration and the child's injuring himself because of his inability to strike back at an adult (42), and as a mild neurotic symptom, a mechanism for the release of nervous tension, and a masturbatory substitute (41). Mannino and Delgado (27) feel that the symptom may well take on different meanings at different levels of development, with the original meaning becoming obscured and less significant in later years.

Attempts at treatment of trichotillomania by traditional psychodynamic psychotherapy have had mixed results. Although some investigators using these techniques (30, 34) report the successful elimination of trichotillomania, others (11, 18, 27, 32, 41) report little or no improvement.

There are no controlled studies of the use of psychoactive medication in patients with this disorder. Childers (7) reports the successful use of chlorpromazine (400–1800 mg) in eliminating trichotillomania in two hospitalized, chronic, severely psychotic women. He reports: "Each patient had spent the better part of five years prior to therapy with chlorpromazine sitting on a bench pulling her hair out with a resultant diffuse alopecia. The two patients were started on chlorpromazine with marked improvement occurring.... When an attempt was made to reduce the dosage in the first patient, her previous behavior reappeared within ten days." These patients were exceptional in that they were chronically hospitalized psychiatric patients, and unlike most other patients, were probably schizophrenic with trichotillomania as one symptom of their fundamental psychological disturbance. Several of the case studies of trichotillomania report that patients were *not* helped by a variety of psychotropic medications.

Ten cases of trichotillomania are reported (3, 5, 13, 25, 28, 36) where behavior therapy techniques were the primary mode of therapy. Each of these cases was long standing (2 to 35 years) and many had been unresponsive to traditional psychotherapeutic treatment. In each case, the trichotillomania was markedly reduced or eliminated within one to 41 sessions. These results were confirmed on follow-up periods of three to six months. These case reports have the following common treatment elements: 1) Patient who is highly motivated and cooperative; 2) the patient is educated about the nature and purpose of the procedures; 3) supportive and directive psychotherapy is offered to improve the patient's social interactions, home situation, etc.; 4) both the patient and the therapist record a pretreatment baseline frequency of hairpulling, continuing this record throughout the treatment period; 5) the use of positive and negative reinforcement individualized to the patient for therapeutic success; 6) the use of deep muscle relaxation and/or hypnosis; 7)

the patient's desire for, and eventual acquisition of, control of his own therapy, i.e., when the patient was finally able to resist the urge to pull his hair, the urge weakened and the trichotillomania remitted.

Taylor (36) reports the treatment of trichotillomania in a 40-year-old woman with a 31-year history of compulsively plucking her eyebrows by a procedure analogous to thought stopping. He instructed the patient to stop any movement of her hand toward her forehead for the purpose of hair plucking and at the same time to say, "No, stay where you are." He reasoned that this exercise would help the woman become aware of the compulsive act when it began, and demonstrate the effectiveness of arresting this early impulse, while at the same time instructing herself to stop. He reports that her trichotillomania was eliminated during the first session and did not recur at four-month follow-up.

Azrin and Nunn (3) report the successful elimination of eyelash plucking and a variety of other "nervous habits and tics" by using a combination of "awareness training, competing response practice, and generalization training." The patients were taught to be aware of their "nervous habits" by describing the details of the movement to the counselor who would alert the patient as soon as a "tic" occurred. The patients practiced detecting the earliest sign of the habit movement. Then they were asked to practice a competing response or activity incompatible with the habit. The competing responses were always different from the nervous habit and capable of being maintained for several minutes—for example, isometric tensing of the muscles involved in the movement. Generalization training consisted of having the client imagine common habit-eliciting situations, imagine he detected the habit movement, then performing and practicing the competing response.

The therapist telephoned the clients after their therapy sessions and praised them for their efforts in inhibiting the habit, and often praised the clients' efforts at self-control and improved appearance during habit-free periods. Using the above procedures, a patient who was picking her eyelashes 50% of the day and had plucked all of her eyelashes was asymptomatic within three sessions. These results were confirmed at five-month follow-up.

Fabbri and Dy (13) report the successful use of hypnosis to treat two patients with long-standing trichotillomania. The hypnotic therapy consisted of systematic muscle relaxation followed by the hypnotic suggestion that "as he became less and less anxious the need to pull out his hair would become progressively less compelling and that he could touch his temple with his right index finger if this would help him relieve any anxiety." The therapist felt that this decision-making responsibility reinforced the patient's sense of self-control. The patients practiced autohypnotic techniques between sessions. One patient had a "90% reduction in hair pulling" within ten sessions and dropped out of therapy at that time, stating he now had control of his

hairpulling and should he have any difficulties he would return for additional therapy. The other patient's trichotillomania was completely eliminated by seven sessions and remained so at six-month follow-up.

Horne (21) reports the successful treatment of two cases of trichotillomania using self-monitoring of hairpulling activity by the patient, relaxation therapy, and hypnotic suggestion. The first client, with a 35-year history of trichotillomania, was asked to record instances of hairpulling and successful resistances to the urge to pull every day. After one-week baseline recording, the patient's hairpulling activity decreased by two-thirds. The patient was then given the hypnotic suggestion that whenever he touched his hand to his head to pull his hair, his hand would become numb and weak. This was followed by five weeks of no hairpulling activity. However, there were a few relapses during the follow-up 48 weeks during periods of life crises. A second patient was only marginally responsive to the above techniques until aversive conditioning was added to the treatment program. The patient was shown a videotape of herself pulling her hair and shocked on her hands each time hairpulling was shown on the tape. After three sessions of aversive conditioning, the patient's hairpulling activity stopped. She had two brief relapses at times of personal crisis during the 18-month follow-up period.

Four additional case reports describe the successful elimination of long-standing trichotillomania by using self-monitoring of hairpulling behavior, positive reinforcement, and punishment. Stabler and Warren (35) report a case with a two-year history of trichotillomania in a 14-year-old girl. In the first treatment session, they told the patient that she would receive "10 points" for each week without any hairpulling, and that when the points totaled 140, she could choose one of a variety of rewards. Additionally, for each week without any hairpulling, she could choose to discuss any topic with the therapist and the therapist would serve soft drinks and crackers during the therapy session. The patient's hairpulling activity stopped completely after the first session and did not recur at six-month follow-up. After the first 14 weeks, the patient had accumulated the necessary 140 points and she chose as her reward a trip to the beauty parlor! Bayer (5) and McLaughton and Nay (28) eliminated long-standing hairpulling activity in a series of patients by requiring them to record hairpulling activity daily and to send the pulled hairs to the therapist, a mildly aversive self-control procedure. In addition to this procedure, McLaughton and Nay asked their patient to reward herself whenever she successfully avoided the urge to pull her hair by imagining one of a number of predetermined positive thoughts—for example, imagining herself with normal hair, imagining a desirable man stroking her hair, imagining herself swimming without a wig, etc. Bayer (5) used these techniques to treat successfully a 22-year-old woman with a two-year history of trichotillomania in 28 days (follow-up not possible due to the subject's untimely death), and McLaughton and Nay (28) reported that a significant

decrement in hair pulling and an increase in hair length were observed over 22 weeks of treatment which was maintained at three-month follow-up in a 17-year-old female with a six-year history of trichotillomania. Levine (25) used self-monitoring of hairpulling and successful resistance to the urge to pull and a covert sensitization-aversion-relief scene to treat trichotillomania. In the aversion-relief scene, the patient imagined himself pulling a hair from his head, which caused a part of his scalp to be pulled out, blood to ooze slowly out of his head followed by hot pus and nausea and vomiting. The relief scene followed, with the subject imagining himself lying on a clean white beach, breathing fresh air, and having no desire to pull. This procedure resulted in a significant decrease in the urge to pull and hairpulling behavior in a 26-year-old male with a 17-year history of trichotillomania. The positive results persisted with the subject reporting being "pleased with himself and in control at last."

SUMMARY

We have reviewed and summarized the psychotherapeutic, psychopharmacological, and behavioral treatments of a variety of psychosomatic dermatoses. Each type of therapy appears to be effective for some patients but not for others. Almost no controlled studies have been conducted in this area of rather prevalent disturbance. To date, the behavioral literature consists of isolated case reports. These studies point to an area that needs further systematic research, particularly since some of the positive results were in patients resistant to psychotherapeutic and psychopharmacological interventions. Until a more definitve literature emerges, it would appear that any given patient would benefit maximally from a combination of all of the above therapies, individually tailored to his particular disability, needs, and desires.

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The Comprehensive Handbook of Behavioral Medicine, Volume 2

CHAPTER 15
The Control of Nailbiting and Cuticle Biting

Dan G. Perkins

Nailbiting is a common habit in children and adults. Extrapolating from available surveys, we may estimate that 40 million people in the United States habitually bite their fingernails, and that 100 million people have had this habit at some time in their life. Nailbiting may begin in infancy. This habit increases to a maximum of 45% of the population during preadolescence and then declines to about 25% of military recruits and college students. The incidence continues to decrease with age to about 10% in the population over 35 years of age (2, 3, 6, 12, 18).

Many explanations have been advanced to account for this habit. Menninger, working within a psychoanalytic framework, felt that nailbiting was caused by the displacement of oral-aggressive impulses originating in intense competitive feelings toward a parent onto the patient's own body (10). Rosow (14) felt it might represent an integral part of an oral-aggressive character structure. Bollard (4) described it as a substitute activity that facilitated the release of hostile conflict and libidinal needs, while Solomon (16) conceptualized nailbiting as an attempt of the organism to develop a homeostatic equilibrium using motor channels for expression, and Weschler (18) viewed it as a masochistic self-multilative behavior. More recently Yates (19) explained nailbiting as a behavior arising from tension and tension relief, and Azrin and Nunn (1) regard this behavior as a learned habit that may start as a normal reaction to an environmental stimulus, but eventually persists because of response chaining, limited awareness, excessive practice, and social tolerance along with possible environmental reinforcement.

TREATMENT PROCEDURES

Nailbiting has been universally recognized as a difficult habit to modify (1). Although most young children will grow out of this habitual behavior, survey data indicate that many retain the habit for much of their life. A variety of behavioral procedures have been developed to treat nailbiting, including negative practice (7, 15), self-administered shock (5), threatened loss of money (17), habit reversal (1, 2, 11), and self-monitoring (9). To date there has been no outcome study to indicate which of these procedures is most efficacious. The following behavioral program has been developed by the author, and has proven effective in clinical practice (13).

Step 1—Awareness Training

Most nailbiting is carried out in an automatic fashion without the client's conscious awareness. As with many other habitual behaviors, the first step in treatment is to help the client become aware of his behavior. Initially he is instructed to sit in a quiet place for ten minutes each morning and evening to practice "awareness training." During this procedure he sits in front of a mirror and goes through the motions of biting his nails as realistically as possible. While carrying out these activities, the client describes the details of his behavior to himself, especially the hand, arm, and head movements associated with nailbiting. He is also instructed to attempt to identify the earliest link in the chain of behaviors that leads to nailbiting. In addition, he can be instructed to focus on the negative aspects of nailbiting while he carries out his prescribed behavior—for example, he might remember that what he sees in the mirror is what other people are seeing when he bites his fingernails.

As with many self-monitoring and symptom prescription paradigms, some clients will stop or markedly decrease the frequency of nailbiting after instituting "awareness training." For example, one woman client with a long-standing nailbiting habit was cured after she observed "how terrible I looked when I bit my nails." Most clients, however, need to combine awareness training with additional behavioral techniques for maximum success.

Step Two—Recording Data

In addition to becoming aware of his behavioral pattern, the client must realize the frequency and circumstances under which the habit is most likely to occur. To establish a baseline rate, the client is instructed to count the number of times a day he bites his nails, and in what circumstances this occurs. He is advised to carry a 3 × 5 note card with him at all times and to

make a note of time and circumstance. This recording is carried out immediately following the behavior, if possible.

From the baseline data, the client can determine what feelings or events precede or follow nailbiting. For example, a client may become aware that he bites his nails after fighting with his spouse, or that others pay more attention to him when he bites his nails. Thus, spousal anger may be a cue for nailbiting and attention may be an environmental reinforcer. Awareness of feelings surrounding the problem behavior may help the client and the therapist formulate a specific treatment plan. For example, if nailbiting tends to acompany anxious feelings, an appropriate anxiety reduction technique such as relaxation training may be incorporated into the treatment plan.

Step Three—The Graph

A graph of self-monitored nailbiting frequency provides the client with a visual representation of progress. Initially, he is instructed to add up the tallies on his 3 × 5 card each day and to transfer this number to a simple frequency graph that indicates the number of times a day he was aware of biting his nails. He is encouraged to display the graph prominently to allow his family and friends to observe his progress and to offer reinforcement in the form of encouragement. As with awareness training, during systematic data collection as a part of the baseline period, some clients stop biting their nails presumably as an effect of increased feedback and self-reinforcement for perceived change.

BEHAVIORAL PROCEDURES

A number of different behavioral procedures can be employed to change nailbiting frequency. Since these therapeutic techniques are not equally effective for all clients, they are instructed to try them sequentially or in combination and to discard those that are ineffective.

Habit Reversal

After a client has been made aware of his habit patterns, he is taught to reverse the habit by incorporating the initial movement into a competitive response; for example, the nailbiter is instructed to grasp a book or his chair when he becomes aware of an urge to lift his hand to his face to bite his nails. The incompatible behavior chosen to substitute for nailbiting should be inconspicuous and of several minutes' duration. Examples of this type of behavior are nail manicuring and grasping the arm of a chair or a steering

wheel. Since nailbiting may occur in many situations, it may be necessary to have a variety of incompatible behaviors for use in multiple situations. Often several alternate behaviors have to be tried before the client makes a successful substitution.

Reinforcement

Once a client has selected a competing activity, he must reinforce the performance of this new behavior if it is to become a viable substitute. For example, a client may grasp the arm of a chair as a behavior incompatible with biting his fingernails and reinforce himself with a cup of coffee or a cigarette. Covert events can also strengthen desired responses. For example, one of the author's students used the covert reinforcement of thinking of her future long, attractive fingernails and her upcoming wedding when she successfully substituted an incompatible behavior for nailbiting.

Behavior Shaping

Patients appear to be more successful if they gradually discontinue nailbiting, rather than trying to quit immediately. By setting progressively greater performance criteria for themselves, they become increasingly successful in controlling the habit.

Punishment

Self-administered punishment can be used to suppress nailbiting behavior. However, as in most treatment programs, punishment used alone tends to induce escape and discontinuation of the treatment program. Positive reinforcement should be used with punishment to help develop competing alternate behaviors.

One form of punishment (5) requires a client to deliver a painful stimulus to himself in the form of an electric shock or a snap from a rubber band worn around his wrist as soon as he feels the urge to nailbite. A second form of punishment, response-cost, such as loss of money, has been suggested by several authors. Like other punishments, response-cost also often leads to escape from the therapeutic program rather than behavioral change.

Motivation

Although most clients asking for treatment of a habitual behavior such as nailbiting are positively motivated to change, often this motivation is not sufficient to ensure therapeutic success. A recent investigation (8) found that client expectation of success is a more important variable than either self-

monitoring or the use of incompatible responses in treatment. The therapist can assure the client of a high probability of success, reinforce his behavior change as it occurs, and he can make negative reinforcement contingencies explicit by reviewing the embarrassment, suffering, and inconvenience the habit causes the client. A Habit Inconvenience Review (1) may aid in this type of counseling.

Maintenance Procedures

Once behavioral change is accomplished, it is necessary to provide a maintenance program to help the client not resume his maladaptive habits and to help him control them should they reappear. Periodic self-monitoring of nailbiting frequency provides feedback to the client about his habit pattern. He can compare this rate with his baseline recorded prior to beginning therapy to monitor progress and relapse. In addition, clients are often instructed to enlist the help of a family member or a friend to look at their graph and their fingernails periodically and provide social reinforcement for maintenance and encouragement in the case of habit resumption. Self-reward for maintenance is very important if the habit is to remain extinguished. Finally, if a client resumes his nailbiting behavior, he is instructed to reinstitute the entire behavioral change program. He is reminded that he is trying to change a lifelong habit and periodic habit resumption of it is not a disaster; it is only an indication that the program needs to be worked through once again.

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