Matthias Richter

Risk Behaviour in Adolescence

Patterns, Determinants and Consequences

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Preface

The present study is a collection and systematic summary of several papers which were published over the last five years. The publication of this volume would not be possible without the help of many people.

My special thanks go to Prof. Dr. Klaus Hurrelmann, former head of the Department of Prevention and Health Promotion at the School of Public Health and now Professor of Public Health and Education at the Hertie School of Governance for his loyal, friendly and stirring support and collaboration. He has indeed broadened my view on research in adolescence and public health. Further, I would like to thank my colleagues who worked with me on the different papers, first of all my former colleagues from the University of Bielefeld: David Bowles, Dr. Michael Erhart, Dr. Anja Langness, Prof. Dr. Anja Leppin, Dr. Rafael Mikolajczyk.

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Finally, I reserve my deepest gratitude to my family and friends for their encouragement and support throughout these years. I could not have done this without them. Although the present book is based on collaborative work I am solely responsible for any mistakes in the contents and arguments of this volume.

Matthias Richter

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1 Introduction

1.1 Background

Adolescents are generally thought to be healthy. However, adolescent risk behaviours such as substance use, a poor diet or early sexual activity are topics that keep generating high media interest. In addition, the past decades have witnessed a remarkable increase in the theoretical and empirical research being done on risk behaviour among young people. Despite considerable explanatory efforts, research on risk behaviour in adolescence is still facing two complementary challenges (Jessor 1998). Those are 1) understanding the processes that link risk behaviour to outcomes that compromise well-being, health and the life course (*consequences of risk behaviour*) and 2) understanding why an adolescent engages in risk behaviour in the first place and identifying the proximate and distal antecedents that influence engagement in risk behaviour (*determinants of risk behaviour*).

In addition to these rather analytical approaches, *descriptive research* on adolescent risk behaviour also faces academic challenges. This is especially true for Germany. Compared to other countries, there is still very little epidemiological data on the distribution and extent of risk behaviour. How many adolescents actually do smoke, drink alcohol, eat unhealthy food or get involved in bullying at school is still largely unknown, for example. Even though findings from several international studies exist, the results cannot be transferred to the situation in Germany, as social and cultural contexts are likely to differ from one country to another. Most of the evidence to be found in Germany is based on data from high-risk groups and/or smaller regional surveys (Appel & Hahn, 2001, Hüttner et al. 1997, 1998, Roth 2002, Raithel 2002, 2003a).

However, with the current view of health as a general condition of *physical*, *mental* and *social well-being*, primary prevention has become more important than secondary prevention, so the knowledge drawn from a normal population is far more interesting than the information obtained from high-risk groups. Only recently, normative populations have been investigated (Hurrelmann et al. 2003, Kraus et al. 2004, Lampert & Thamm 2007, Richter et al. 2008).

Furthermore, there is growing interest in analyses of adolescent risk behaviour across countries and over time. Cross-national research has recently proven to be a key challenge in scientific studies of adolescent risk behaviours, since a comparison of different social and cultural contexts may capture *what is general or local* (Michaud et al. 2001, Jessor et al. 2003, Ciairano 2004). But scientific interest is not limited to differences in involvement in risk behaviour or risk perception. Rather, the focus is on the similarities and differences in the associations within and between the behaviours and their determinants (Crockett 1997, Moore & Parsons 2000). These comparative research efforts are driven by the ongoing search for *social factors* that protect youth, impose risks or explain risk behaviour (Michaud et al. 2001). In addition, from a public health perspective it is also important to study changes in risk behaviour over time in order to monitor trends, identify target populations and advocate for support (Brener et al. 2003). For target-orientated prevention and health promotion it is necessary to have valid data on the distribution and trends of health-related risks. Without that information preventive actions cannot be planned, evaluated or adjusted on a population basis (Lampert & Thamm 2007, Settertobulte & Richter 2007). So far, data on comparative perspectives across countries and over time are rare.

Focussing on analytical approaches and the *antecedents of risk behaviour*, it becomes apparent that existing research is strongly focussed on individual and psychological determinants of risk behaviour. More than 15 years ago, Richard Jessor (1991: 597) already summed it up as follows: "[…] in too much of the discourse in the field there has been a failure to recognize the fundamental role of socially organized poverty, inequality, and discrimination in producing and maintaining a population of at-risk youth." Only recently have scholars started to focus on

'upstream' factors such as social inequalities or the wider social structure. Thus, little scientific progress has been made during that time. Although the importance of individual lifestyle patterns for future health has long been accepted, little is known about the extent and pattern of socio-economic differences in risk behaviour during adolescence. Despite the relative consistency of socio-economic differences in health risk behaviour in adulthood (Cavelaars et al. 1997, Tyroler 1999, Droomers et al. 1999), it is less clear at which stage in life these differences are established. In addition, the existing evidence on the relationship between socio-economic status and risk behaviours in adolescence is inconsistent and even contradictory (Richter 2005, West & Sweeting 2004). Moreover, research on socio-economic differences in adolescent risk behaviour suffers particularly from a lack of comparative perspectives over time and across countries.

Another issue requires attention in this respect: In (social) epidemiology, risk behaviours are often understood as a 'common set' of behaviours that put individuals 'at risk'. Little attention was given to the organisation and structure of diverse risk behaviours. Most studies rarely examine a range of behaviours but instead focus on a single behaviour or a small set of behaviours. In addition, less attention was paid to the potential positive functions of such behaviours within the social context (Hurrelmann & Lösel 1990, Ciariano 2004). Some of the outcomes or consequences of risk behaviours can be positive, desirable, and sought by adolescents. The different behaviours have different meanings and functions for adolescents, and it is likely that they are influenced by different social contexts (Michaud et al. 2001). This raises important questions about the origin or source of covariation and patterning.

While several studies have indeed shown, for example, that substance use performs a function in adolescent life, not much is known about how these effects are influenced and patterned by socio-economic or cultural determinants. Furthermore, not much is known about whether certain behaviours are more strongly influenced by socio-economic status (SES) and whether those behaviours have different functions among different socio-economic groups. Understanding the functionality and patterning of risk-taking is crucial to the development of intervention programmes offering alternative behaviours that are less

health-compromising but capable of performing the same or similar functions as the risk behaviours they are intended to replace.

Turning to the second contemporary challenge in the research on adolescent risk behaviour, i.e. understanding the processes that link risk behaviour to outcomes, it is striking that most attention was paid to the long-term effects of lifestyle patterns. This may be explained by the fact that risk behaviour is a key determinant for the leading causes of morbidity and mortality in later life. Recent evidence however suggests that risk behaviours produce a variety of undesirable health outcomes as early as adolescence. Already in adolescence, the health status is determined to a certain extent by individual behaviour (Geckova 2002). Preventable risk behaviours such as the consumption of substances, lack of physical activity but also engagement in violent behaviour and the practice of risky behaviour in road traffic are significant factors contributing to disease and injuries in adolescence (Boreham et al. 1999, Holmen et al. 2000, Kulbok & Cox 2002).

The present study tries to address these theoretical and methodological challenges by using different descriptive and analytical approaches. It is an obviously limited attempt to shed more light on various risk behaviours of adolescents that can compromise personal health as well as psychological and social well-being during adolescence and beyond. The aims of the study, the theoretical model, the research questions and the structure of the volume are elaborated to greater extent in the following chapters.

1.2 Aims of the study and research questions

As outlined above, adolescent risk behaviour can be studied in both directions: in terms of its (psychosocial) antecedents and determinants as well as in terms of its effect on psychosocial and health-related consequences. Both approaches are addressed in the study in order to contribute towards the knowledge of adolescent risk behaviour. Compared to other countries not much is known about how adolescent risk behaviour is shaped by different key determinants such as age, gender and socio-economic status in Germany. In addition, little is known about

how these relationships have developed over time. Another aspect that is largely unclear is the pattern of risk behaviour across countries. Since the data used in the study also allow a comparative perspective across countries, a unique opportunity to analyse risk behaviour in the context of other cultures and countries is provided. Therefore, the first aim is to analyse the distribution of multiple dimensions of risk behaviour across key determinants as well as across countries and over time.

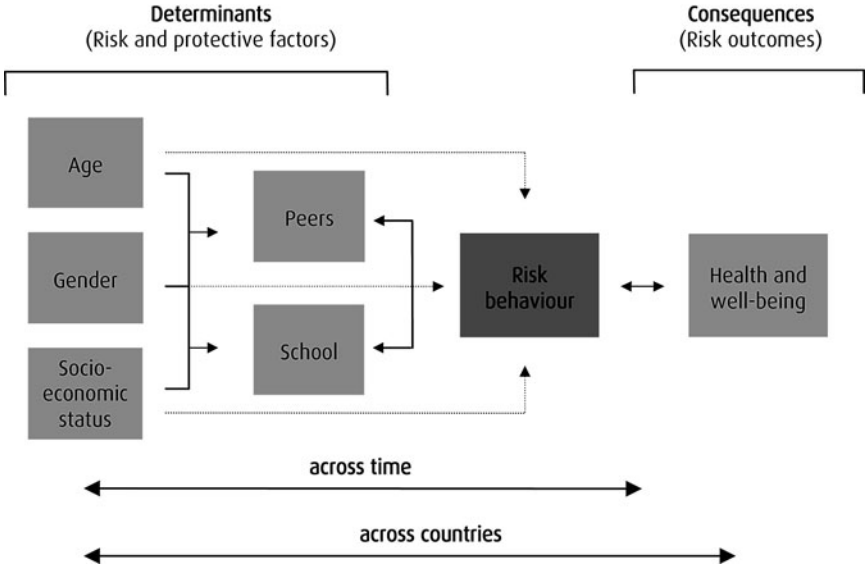
The second aim is to go beyond the description of risk behaviour and try to understand the circumstances that give rise to and sustain clusters or syndromes of these behaviours. Social epidemiological research on adolescent risk behaviour has not paid much attention to the characteristics and functions of risk behaviours. However, it is likely that relationships between different behaviours and key determinants will differ – especially in terms of socio-economic status. It makes a strong difference for understanding and intervention to be dealing with separate, independent, and isolated risk behaviours or, instead, with an organised constellation of behaviours that are interrelated. Therefore, the second aim is related to the question of the degree to which there is structure and organization among the different risk behaviours in adolescence.

Health risk behaviours are not developed individually. Instead, they are part of a behavioural 'programme' that is acquired in the socialisation process. Behaviours and attitudes acquired and established in adolescence develop first in the family environment; later as well in interaction with and through role models in the wider social environment (e.g. the peer group or the media). So far, research on health inequalities in adolescence has rarely focussed on the effect of socio-economic status and various psychosocial determinants from the peer or school context on risk behaviour. Understanding these relationships is important for preventive and health-promoting efforts because it might provide valuable indications in what setting programmes are necessary and effective. Thus, the study also seeks to identify the role of various psychosocial peer and school determinants within the context of socio-economic status and risk behaviour.

Moreover, not much is known about the short-term effects of risk behaviour on health and well-being in adolescence. The existing evidence largely focuses on high risk groups, and mainly on the consequences of adolescent substance use such as intoxication and reckless driving. Thus, one last aim is to analyse whether individual behaviours are associated with health outcomes in adolescence and how they mediate the relationship between socio-economic status and health.

Following Jessor (1991) and his conceptual framework of adolescent risk behaviour, the global aims of the study can be summarized in a simple theoretical model that documents the relationship between the variables (Figure 1).

Figure 1: Research model [1]



1 According to the research aims this model presents only a number of (potential) mechanisms and determinants. Not all theoretically possible mechanisms in the sense of a comprehensive model are taken into account.

Risk behaviour represents the central element of the model. Age, gender and socio-economic status are key determinants associated with risk behaviour, either directly or indirectly through different social contexts (such as peer groups and/or school). Knowledge of direct and indirect effects ought to be of great importance when it comes to designing interventions and deciding on the most promising strategies of intervention. On the other hand, risk behaviour is also analysed as an independent variable that might be associated with one's health, well-being and the life course. A detailed analysis of these questions might be a first step toward understanding and taking action in the area of adolescent risk behaviour.

Research questions

According to the theoretical model, the present study is based on four core themes with different research questions that attempt to unravel the complexities underlying adolescent risk behaviour:

1. *Age and gender differences and patterns of adolescent risk behaviour*

   To assess the relationship between age, gender and different aspects of adolescent risk behaviour in Germany in a cross-sectional as well as a comparative perspective over time and across countries in order to identify patterns of risk behaviour.

2. *Socio-economic determinants and patterns of adolescent risk behaviour*

   To analyse whether there are socio-economic differences in risk behaviour among German adolescents, whether certain risk behaviours are more strongly associated with SES than others and whether the relationship between various measures of SES and risk behaviour changes across countries and time.

3. *The role of social context for adolescent risk behaviour*

   To explore what peer and school factors are associated with risk behaviour in adolescence and to assess their role in the relationship between age, gender, socio-economic status und risk behaviour.

4. *Consequences of adolescent risk behaviour* [2]

   To assess (health-related) consequences of adolescent risk behaviour in relation to age, gender and socio-economic status and to explore the relative importance of socio-economic differences in risk behaviour for socio-economic differences in health.

1.3 Structure and content of the volume

The volume is structured in four parts. The theoretical background will be presented in chapter 2. A conceptual framework that might facilitate both understanding and action in the area of adolescent risk behaviour will be introduced. The chapter starts with a short definition of risk behaviour in adolescence (chapter 2.1) and then turns to a more general elaboration of adolescent risk behaviour from a developmental perspective (chapter 2.2). Chapter 2.3 discusses several determinants of risk behaviour and presents recent evidence of age, gender and socio-economic differences in risk behaviour during adolescence. The last chapter 2.4 focuses on the consequences of risk behaviour. Chapter 3 presents the technical background of the research programme. The research context (chapter 3.1) and the data from the "Health behaviour in School-aged Children" study will be elaborated on (chapter 3.2). The data collection procedures (chapter 3.3) and descriptions of the samples used in the present study are provided; that is followed by a brief description of the measures (chapter 3.4) and statistical analyses used

2 The term 'consequences' is used from a theoretical perspective of the long-term consequences of risk behaviour for adult morbidity and mortality. As the data presented here is cross-sectional, a cause and effect-relationship cannot be analysed.

(chapter 3.5). The empirical findings are presented in chapter 4. The chapter is structured in conformity with the four overall research topics. Each research topic is based on findings from several single studies. Chapter 4.1 describes age and gender patterns of risk behaviour in Germany as well as in a comparative perspective over time and across countries. In chapter 4.2 a similar perspective is adopted for the identification of socio-economic differences and patterns in adolescent risk behaviour. Chapter 4.3 deals with the effect of more proximate determinants of risk behaviour in adolescence, such as factors associated with the peer and school context. Chapter 4.4 explores the association between risk behaviours and health-related outcomes as well as possible mechanisms in the relationship between socio-economic status and health. Chapter 5 summarises the findings (chapter 5.1), provides an outline for further research and shows the implications for prevention and health promotion (chapter 5.2).

2 Conceptual framework

Risk behaviour in adolescence has attracted a lot of attention over the last 40 years (Jessor 1998, Raithel 2004, Hurrelmann 2006). Innumerable studies were conducted in order to promote a better understanding of the universal phenomenon of risk behaviour. Thus, how compromising early onset, excessive use and multiple risk behaviours are for future health is widely known (Richter & Settertobulte 2003, Klein-Heßling 2006, Fischer & Leppin 2006, Hurrelmann & Richter 2006). It is also known that, besides the family, the peer group plays a central role in the prediction of various risk behaviours. However, current research is beginning to argue that the descriptive knowledge base does not have a conceptual underpinning and is insufficient for a comprehensive assessment of adolescent health and risk (Kulbock & Cox 2002). The aim of this section is to provide a brief introduction to the definitions and concepts of risk behaviour, outline different explanatory approaches of risk behaviour and review recent epidemiological findings.

2.1 What is risk behaviour?

Even though risk behaviours are not confined to one period of life, adolescence has a special importance because (risk) behaviours are to a large extent established in this period. *Adolescence* refers to a period of time between childhood and adulthood and generally includes young people aged 11 to 21 years (Oerter & Dreher 1998, Richter 2005). In general, the concept of 'risk behaviour' is mostly recognised as a specific form of inappropriate problem handling during this time (Hurrelmann & Richter 2006). Risk behaviour is understood to be behaviour

with undesirable consequences that go hand in hand with a probability of harm or loss (Cairns & Cairns 1994, Reese & Silbereisen 2001, Raithel 2004, Hurrelmann 2007). Although there is no clear consensus in the literature about the definition of or the key elements encompassed in the concept of risk behaviour, it is generally agreed that such behaviours are those that are directly or indirectly associated with health and well-being (Jessor 1998, Hurrelmann & Richter 2006).

Recent work has extended the perimeter around these problem behaviours and has recognised the functional commonality of risk behaviours with other domains of adolescent activity that also compromise healthy development: inadequate social role performance (such as poor school progress), psychopathology (such as depression), and health-compromising behaviours (such as poor dietary practices or insufficient exercise) (Jessor 1998). The term risk behaviour therefore refers to any behaviour that can compromise psychosocial aspects of successful adolescent development. Substance use, delinquency, unhealthy dietary behaviour, reckless driving as well as inadequate psychosocial adjustment are some obvious examples (Kulbok & Cox 2002, Klein-Hessling 2006, Hurrelmann & Richter 2006). But psychological impairments such as depression, bulimia and anorexia nervosa can also be regarded as risk behaviours. Thus, risk behaviours can be considered as *risk factors* for personally, socially or developmentally undesirable outcomes. These adverse outcomes can have enduring consequences at considerable cost to individuals, families and the wider community.

2.2 Risk behaviour in adolescence: a general framework

The fact that risk behaviour starts and/or occurs particularly often in adolescence, points to a linkage with the psychosocial development of adolescents (Pinquart & Silbereisen 2002, Klein-Hessling et al. 2005). When taking into account the fact that psychosocial risk has to be conceptualised within a specific period of life with its peculiar developmental tasks, it is important to consider the socialisation process of adolescents (Hurrelmann & Richter 2006). Generally speaking, this process can be viewed as ‘successful’ when young people manage to cope with

a multitude of developmental tasks and transitions and thus combine the requirements of individuation and integration with each other (Havighurst 1952, Raithel 2004, Hurrelmann 2006). Adolescents are confronted with the challenge of how to handle rapid changes in their bodies, emotions and ways of thinking while simultaneously adjusting to socio-cultural requirements and acquiring socio-economic qualifications (Hurrelmann 2004). If they do not succeed in doing so, or only to an insufficient extent, it is possible for their developmental tasks to run into problems that prejudice the further development of their personality and health (Dryfoos 1990, Irwin & Millstein 1992, Elliott 1993, Hurrelmann & Richter 2006).

In the present study a psychosocial stress model is proposed that provides a detailed framework for investigation of the factors and processes likely to promote a less risky developmental transition to adulthood (Jessor & Jessor 1997, Hurrelmann 2006, Hurrelmann & Richter 2006). It also provides a multi-causal and probabilistic theoretical framework: a model that recognises the active role of the adolescent, as a whole person, in shaping his/her development, selecting goals and making choices within the scope of the opportunities and the constraints of his/her environment (Silbereisen & Todt 1994, Schulenberg et al. 1997). The model assumes that risk behaviour results from an interaction of psychosocial stressors from various socializing agents and inadequate coping strategies (Hurrelmann & Richter 2006). In this respect, risk behaviour serves as a tool to solve contextual needs and problems in the developmental process. Psychosocial stress can occur in the family, peer group or school context and must be viewed in relation to the developmental tasks (Raithel 2004, Richter 2008).

The underlying assumption is that most risk behaviours are functional for the mastery of developmental tasks in adolescence and that risk behaviour originates from problems with the mastering of these tasks. This perspective is consistent with a developmental-contextual framework that emphasises multidimensional and multidirectional development across one's life span (Schulenberg & Maggs 2002, Hurrelmann & Richter 2006). It provides a stronger foundation for addressing fundamental questions about the aetiology of risk behaviour and enables a developmentally more sensitive understanding.

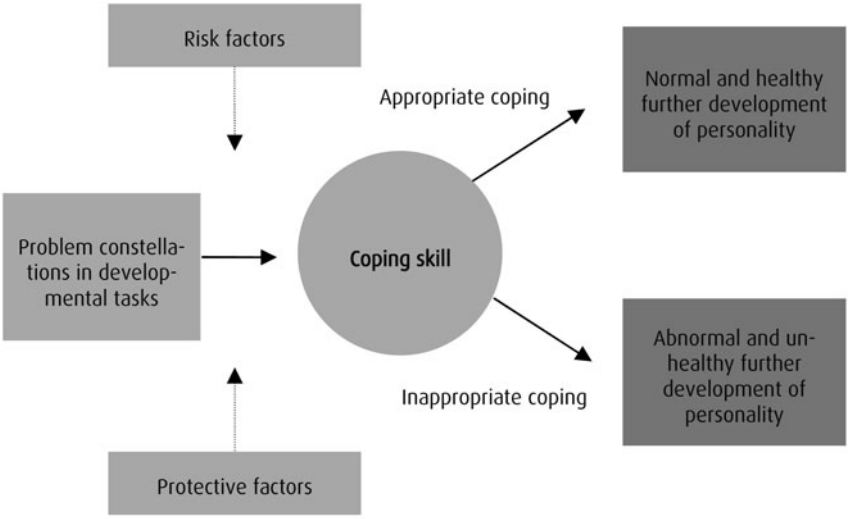
2.2.1 Risk behaviour as reaction to developmental tasks

In most theoretical models, developmental tasks and transitions are viewed as temporary and sometimes as causally preceding risk behaviour (Schulenberg et al. 1997, Schulenberg & Maggs 2002). As outlined above, risk behaviour in adolescence can be viewed as an important component in the negotiation of developmental transitions. Whenever developmental transitions contribute to stress that exceeds current coping capabilities, health and well-being are likely to suffer, and risk behaviours may be used as an alternative way of coping (Hurrelmann & Lösel 1990). One single developmental transition rarely contributes to stress, and in many cases coping capacities are not overwhelmed and health is not adversely affected. Nevertheless, given the major and multiple transitions that occur during adolescence, existing coping strategies may have difficulty keeping up with developmental stress (Klein-Hessling et al. 2005, Ciairano 2004). Therefore, we consider adolescent risk behaviour as the result of a long-lasting and, for the life-phase characteristically, overwhelming psychosocial level of stress linked to inadequate coping capacities (Hurrelmann & Richter 2006).

The moulding of problem-handling skills is a decisive factor in determining whether the problem constellation posed by developmental tasks can be successfully coped with or not. The individual coping process is influenced by a large array of individual as well as psychosocial risk and protective factors for adolescent risk behaviour (see Figure 2):

Appropriate coping guarantees that, despite difficult problem constellations, no harm will come to one's physical and psychosocial state and no symptoms of social deviation will arise. The chances to attain the competence skills required to cope with developmental tasks and limit the extent of 'crises' are good for those adolescents who have had an active and open-minded attitude from early childhood on. Adolescents who develop a great ability to learn also have an advantage because they can turn crises and strain into productive challenges that strengthen and stabilize their personality. They have a high ability to organize their personality 'on their own'.

Figure 2: Developmental tasks and appropriate or inappropriate ways of coping with them



Source: Hurrelmann & Richter (2006)

Inappropriate coping can lead to risk behaviour. Adolescents with inappropriate coping skills are limited to defensive, passive or evasive reaction strategies (see below) in problematic situations engendered by developmental challenges. These adolescents have not developed adequate strategies to analyse situations, search for information, influence troublesome conditions, change one's behaviour and harmonize one's feelings and expectations. Their resources are inadequate for the job of warding off social and health-related harm (Silbereisen & Todt 1994).

Inappropriate coping makes it impossible to effectively deal with problem constellations arising from developmental tasks and related crises in the individuation and integration process. It is possible for a situation to arise in which excessive temporary or permanent demands are made on the ability to act. This is then reflected in 'abnormal' and unhealthy

development with various symptoms of disorders (i.e. risk behaviour). The discrepancy between developmental demands on the one hand and coping skills on the other results in 'unfit' solutions which, in terms of the way they are manifested and their consequences for the social environment, are unacceptable and unproductive for the development of a person's personality and health. In this context it is possible for unfit solutions to take various forms of risk behaviour (Steptoe et al. 1994, Hurrelmann & Richter 2006).

2.2.2 Functions of risk behaviour

Considerable research has shown that risk behaviours are functional, purposive and goal-directed and that these goals are often central to adolescent development (Jessor 1991, Pinquart & Silbereisen 2002, Klein-Hessling et al. 2005, Hurrelmann & Richter 2006). The main instrumental function of risk behaviour lies in 'mastering' developmental tasks and other challenges. This function is actively employed by young people to meet the specific demands of adolescence and is considered to be an attempt to confront life's everyday problems and challenges. Accordingly, risk behaviour may assist in or play a fundamental role in negotiating certain developmental tasks and can be understood as a manifestation of developmentally appropriate experimentation (Engels & Bogt 2001, Ciarianio 2004).

Taking substance use as an example, risk behaviour can be linked to a wealth of instrumental and expressive functions (Silbereisen & Noack 1998, Raithel 1999). For example, facilitating *acceptance by* and *integration* in a clique, *stabilising* an acquired social position and also expressing *identification* with the adolescent subculture. Substance use can also be seen as a *symbol of opposition* to demonstrate a break with and resistance to conventional norms and parental/societal value notions. As an excessive pattern, risk behaviour enables young people to experience and try out *individual degrees of freedom* and to gain control over situations and oneself. It also serves as a *counterpoint* to the routine of normal life. One indulges in risk behaviour for the enjoyment, the fun and the pleasure of experimentation. In addition, risk behaviour

like substance use can be seen as a *relief-providing, compensatory or surrogate act* aimed at coping with a lack of status, developmental problems, frustration, real and anticipated fears. Risky practices likewise help to flee from the fate of having to become an adult, and are thus reasonable.

While research on the functions of risk behaviour largely focused on substance use, other forms of risk behaviour are also likely to be functional. For example, the consumption of fast food can be interpreted as a reaction to norms of the parents' nutritional behaviour because some forms of nutrition in the family are strongly regulated by the parents (Pinquart & Silbereisen 2002). Deviation from these norms can be used by adolescents to distance themselves from their parents and gain autonomy. Another example is weight-control behaviour. It is likely that being on a diet can be used by (female) adolescents to gain acceptance by the peer group and to find new or more friends. The wish to be attractive for the other gender can also promote regular physical activities and sport. However, adolescents often retire from those activities when other developmental tasks that are not satisfied in this domain become more important. These findings indicate that risk behaviours are multifunctional: one behaviour can serve different functions but different behaviours can also fulfil the same psychosocial functions.

These findings from international research show that risk behaviour can have both a constructive as well as a destructive function in adolescents' health and development (Jessor & Jessor 1997). On one hand, for example, risk behaviour could be detrimental to one's health – when, for instance, autonomy-seeking behaviour leads to non-compliance with behavioural regimes necessary for the management of chronic illnesses. On the other hand, such behaviour appears to be an important aspect in negotiating greater autonomy from one's parents (Irwin & Millstein 1992). Risk behaviours that from a public health perspective are crucial determinants of current and future health are actively employed by adolescents to meet specific requirements of this time of life and are used to cope with life's daily problems and challenges. Therefore, risk behaviour should not per se be evaluated negatively (Janin Jacquat et al. 2001). Moreover, it is important to keep in mind that, for example, the

learning process for responsible handling of tobacco and alcohol can have an adaptive function in adolescent development.

2.2.3 Integrative model of risk behaviour

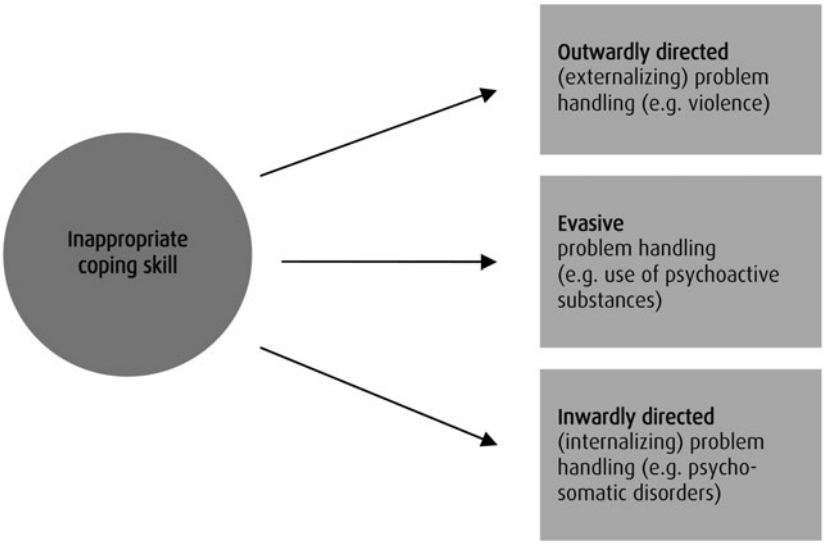
As already indicated, inadequate coping processes can result in different risk behaviours. Nevertheless, some of these variations seem to cluster in very similar dimensions that can be described as *externalising*, *internalising* or *evasive* forms of risk behaviour (Hurrelmann & Richter 2006, see Figure 3):

- The pressure exerted by the problems confronting adolescents can be directed 'outward' towards the social environment of the family, school, workplace, friends and the public (*externalising variant*). In the case of the externalized variant the unpleasant consequences of badly damaged self-esteem are, to a certain extent, *shifted to the outside world.* This is due to the fact that one is incapable or unwilling to confront them with the core of one's personality. In the social realm that includes social and political protest, participation in illegal groupings, criminal behaviour and violence. In terms of health, externalising behaviour can be expressed as aggression, bullying, hyperkinetic disorders or antisocial behaviour.

- The pressure exerted by problems can also be directed 'inward' to one's psyche and body (*internalising variant*). The adolescent reacts with helplessness because *he/she sees himself/herself as responsible but lacks the knowledge needed to find a solution.* In the social realm this variant is expressed by withdrawal and isolation, a lack of interest in public events and a lack of engagement; in terms of health it can manifest itself in psychosomatic disorders, suicide attempts, dieting behaviour or medicine use.

- The handling of problems can take a third direction that is neither outward nor inward (*evasive variant*). This 'getting out of the way' is expressed in the social realm by nonconformist types of behaviour and fickle, capricious social relationship patterns. In terms of health it often appears as addictive behaviour such as the use of legal and illegal drugs, compulsive consumption or TV viewing. These types of behaviour are a combination of inwardly and outwardly oriented variants.

Figure 3: Risk behaviour: forms taken by the consequences of inappropriate coping



Source: Hurrelmann & Richter (2006)

In terms of their subjective logic, all three variants represent a respectively conclusive and plausible solution to stress and problem constellations. In each case, however, this 'solution' is only a *pseudo solution* since the actual initial problems and their causes are not treated with

rigor. Instead of confronting the unpleasant and difficult job of working on one's personality, one evades it, blames others or withdraws into isolation. In the long run, this mechanism results in negative dynamics for any further development of one's personality.

2.3 Determinants of adolescent risk behaviour

In general, behaviours that compromise health and adolescent maturity are not developed individually. Instead, they are part of a behavioural 'programme' acquired in the socialisation process (Hurrelmann 1990, 2004, Raithel 2004). Adolescence is a period of rapid development when young people acquire new capacities and are faced with many new situations. It represents a significant phase of life due to an abrupt increase in social influences. In no other period do so many influences from different social contexts accumulate so fast, in which young people have to orientate themselves between conflicting priorities (Hurrelmann & Richter 2006, Lampert et al. 2006). Next to family, the school environment and peer group gain increasing importance. When they move on to secondary school, adolescents are confronted with socialising influences from various areas, influences that play a mediating role between the social structure and the adolescent. This development presents not only opportunities for progress but also risks to one's health and well-being. Potential developmental stressors capable of compromising health and leading to risk behaviour are primarily found in these social contexts (Irwin et al. 2002, Richter 2008, Raithel 2004, Richter & Mielck 2006).

Children and adolescents are exposed to a variety of risk behaviours over the life course. In childhood, risk behaviour is still subject to parental influences: the parents set the standards in terms of hygiene, nutrition, physical activity, sleeping patterns, etc., and control their compliance. With the beginning of adolescence, young people increasingly decide about their own behaviour. This is probably one of the reasons why adolescence is also the key period for substance use. At this age most young people have had their first experience with psychoactive substances (e.g. tobacco, alcohol and cannabis). Accordingly, a number

of risk-related preferences and behaviours are in part consciously, in part unconsciously tested, learned, strengthened or discarded (Pinquart & Silbereisen 2002, Richter 2005). Most of the habits, values and lifestyles 'successfully' established during this important formative period are likely to continue throughout life and, consequently, have enduring consequences for individual health (Jessor 1998, Richter & Settertobulte 2003, Fischer & Leppin 2006). These behaviours threaten the well-being of teens and limit their potential to achieve responsible adulthood (Resnick et al. 1997). As outlined above, several risk and protective factors influence the likelihood of engaging in risk behaviour. They stem from or are largely influenced by the various social contexts in which adolescents live (Hurrelmann & Richter 2006, Richter & Mielck 2006). Important determinants of risk behaviour and their social contexts will be discussed in the following sections. A special focus will be placed on social determinants since they play a major role in the socialisation process (Ciairano 2004, Richter 2008).

2.3.1 Age and gender

Chapter 2.2 already outlined the fact that age is a crucial factor in the development of risk behaviours. As children grow and develop, systematic changes can be observed in terms of the risk behaviours they engage in and the social influences surrounding them (Richter & Settertobulte 2003, Raithel 2004, Currie et al. 2008, Richter 2008). It is perhaps unsettling that many of these trends are negative. While some behaviours increase with increasing age and – for the majority of adolescents – decline after early adulthood is reached, other behaviours show a slight decline in adolescence without any increase in adulthood. Drinking and drunkenness, smoking, experimentation and regular use of cannabis dramatically rise with increasing age (Currie et al. 2008). The regular consumption of substances increases around the age of thirteen in particular. This is not surprising as experimentation with so-called 'adult' behaviours is considered normal for teenagers in many countries and cultures (Currie et al. 2004).

The general increase in some behaviours is accompanied by a decrease in other behaviours. This is reflected in the observed declines in positive health behaviours. For example, adequate physical activity and a healthy diet decrease with increasing age while the consumption of unhealthy food, sedentary activity and dissatisfaction with the body and the number of diets increase. Findings from international studies show that these age-related trends are an unavoidable feature of adolescence (Currie et al. 2004, 2008a, Hibbel et al. 2000, 2004). Yet, not all of these risk-taking tendencies should be interpreted as negative. Rather, they could be viewed as steps along a social path that can lead to a range of possible health outcomes. However, if these steps go unchecked, the health of the growing child could very well deteriorate (Currie et al. 2008a).

Next to age, gender plays a similarly important role in the prediction of risk behaviour (Kolip 1997, Helfferich 2001). In general, boys and girls differ in terms of their strategies and the results of their coping processes, and therefore also in terms of their risk behaviour (Helfferich 1997, Hurrelmann & Bründel 2003, Raithel 2003). These issues tend to cluster and are vital to our understanding of youth health and for guidance in respect to appropriate policy and practice responses. The gender-specific differences indicate a functionality of risk behaviour when it comes to the development of a gender-role identity (Raithel 2004). Boys and girls not only choose different modes of coping, they also have to cope with qualitatively different developmental tasks in adolescence (Kolip 1997). Male and female risk behaviour apparently follows different logics (i.e. gender-specific functions in the developmental process). Furthermore, girls reach puberty earlier than boys and are therefore exposed to developmental stress earlier than boys.

Due to gender-specific socialisation processes girls cope with developmental tasks and transitions in a much more internalising way than boys, and they also react more directly in the form of health-related psychosocial impairments (Hagemann-White 1984, Kolip 1997, Hurrelmann & Richter 2006). Despite more frequent consumption of healthier foodstuffs and lower levels of overweight and obesity, they are more likely to be on weight-reducing diets, skip meals, use medicine and be dissatisfied with their bodies. Boys prefer to use externalising and/or evasive forms of inappropriate coping behaviour (such as engagement in

substance use and physical activity). Some studies show that gender differences in some risk behaviours (e.g. tobacco and alcohol use) are continuously diminishing (Richter & Settertobulte 2003, Currie et al. 2008a). It is likely, though, that this growing similarity applies to more moderate behavioural patterns. As for 'harder' behavioural patterns, boys still show higher prevalences, especially among older adolescents. Thus, the fundamental differences between boys and girls still exist and show a strong persistence across behaviours. Overall, it is important to note that existing data do not universally favour one gender over the other, rather they illustrate that there are different issues of concern for males and females (Currie et al. 2008a).

2.3.2 Socio-economic status

Children are born into a specific socio-economic environment that strongly influences the possibilities young people will have to achieve and sustain good health as well as a high level of well-being (Mielck et al. 2002, Richter 2005, Lampert et al. 2006, Currie et al. 2008b). Several studies have shown that social disadvantages in early life can involve further social and health-related disadvantages and can significantly impact the further development of health and well-being in later life (Dragano & Siegrist 2006, Richter & Hurrelmann 2006, Davey Smith 2008). Thus, even in rich countries such as Germany, large segments of young people are growing up in circumstances of limited resources and persuasive adversity that, for many of them, will influence their development, indeed their lives as a whole. They are certain to be severely compromised (Lampert et al. 2006, Richter & Mielck 2006).

However, little is known about the pattern and the appearance of social inequalities in health during adolescence in Europe and, especially, in Germany (West 1997, Starfield et al. 2002, Richter 2005, Chen et al. 2002, 2006, Currie et al. 2008b). Research on socio-economic inequalities in health largely focussed on adults and children. These findings clearly show that individuals with lower education, occupational status and lower income suffer more often from poor health and have a higher mortality than those who are better off (Richter & Hur-

relmann 2006, Bauer et al. 2008). For a long time adolescence did not seem to reveal anything of particular interest for the genesis of socio-economic inequalities in health and risk behaviour. This lack of research was particularly surprising, as evidence of a relationship early in life between socio-economic status and risk behaviours would be a matter of concern and would constitute a particular challenge for health and social policy (Richter & Mielck 2006). Only recently has an interest in the adolescent age group emerged, and it now represents an active and important area of research (West & Sweeting 2004, Spencer 2006, Hagquist 2007, Piko & Fitzpatrick 2007, Torsheim et al. 2006).

As for socio-economic inequalities in adolescent health, a complex picture has generally been reported in different studies, with strong patterning of health outcomes according to socio-economic status (SES) in some cases and a lack of such inequalities in others (Spencer 2006, West 1997, Lampert et al. 2006, Currie et al. 2008b). The relationship between socio-economic status and risk behaviour in adolescence is just as inconsistent and contradictory as it is for premature mortality and morbidity (Richter 2005, Lampert & Richter 2006). The findings vary not only with the individual behaviours but also between existing studies und gender (West 1999, Nickel et al. 2008). In general, the results suggest that some risk behaviours are more sensitive to family socio-economic circumstances than others. While some studies have identified an unequal distribution of tobacco, alcohol and illegal substance use among socio-economic groups (Lowry et al. 1996, Goodman & Huang 2002), others have found no socio-economic differences, or only slight ones, for these behavioural factors (Donato et al. 1994, 1995, Tuinstra et al. 1998, Challier et al. 2000, Mullan & Currie 2000, West 1999). More consistent socio-economic differences are found for ‘positive’ behaviours such as nutrition and physical activity (Bergström et al. 1996, Tuinstra et al. 1998, Xie et al. 2003, Wardle et al. 2003). The variation in findings has been attributed to the use of different measures for socio-economic status, risk outcomes and behaviours examined; also to the age group, gender and country of the population under study.

The complex nature of socio-economic inequalities in health during adolescence underlines the potential this phase of life has to provide a better understanding of the origins of socio-economic differences in

adult health and possible pathways by which health inequalities produce and re-produce (Lampert et al. 2006, Richter & Mielck 2006). It is also important in its own right since programmes designed to improve the health of young people need to address the potential importance of socio-economic determinants.

2.3.3 Peer and school context

Even though it is widely known, for example, which risk behaviours are health-damaging and how dangerous smoking, drinking and physical inactivity are for later health, but there are only few ideas about which social and therefore preventable determinants and mechanisms are responsible for adolescents practicing and maintaining risk behaviour. The strong association between adolescent development and risk behaviour, however, shows that these determinants and mechanisms must stem from the various social contexts adolescents live in (Hurrelmann 2004, Richter 2005, Lampert et al. 2006). The family, school and the peer group comprise the central socialising contexts in adolescence. Although they are located at different levels, they have a strong reciprocal effect on each other (Hurrelmann 2002, Sander & Vollbrecht 2000). These contexts influence and control the dramatic biological and psychological changes which involve almost all areas of life, including health (Pinquart & Silbereisen 2002, Ciairano 2004).

The family is by far the most important social context for child development and represents the central socialising agent in the life of young people. The family environment therefore constitutes a social context that significantly forms and determines health and where behaviours and attitudes are adopted for the first time (Schnabel 2001, Klocke & Becker 2003, Erhart & Ravens-Sieberer 2008). For a large number of researchers the family represents the by far most important setting for health. The influence of the family environment on health lasts not only throughout adolescence, it is present throughout the whole life course – though to varying degrees. However, the developmental perspective shows that the role of parental influences decreases with increasing age. While the social contexts of young people increasingly widen with in-

creasing age, the importance of secondary (e.g. school) and tertiary socialising agents (e.g. the media and peer groups) also increases. Thus, risk behaviour is increasingly associated with influences outside the family (Richter & Mielck 2006).

Next to family, the school environment constitutes the most important socialising context for children and adolescents (Hurrelmann 1999, 2002). The school relieves the family of a large part of its socialising tasks. When just the time young people spend at school is borne in mind, the important role played by that institution for the development of children and adolescents becomes obvious. While the health-related consequences of several psychosocial aspects of the work environment in adulthood have been the subject of intense research, still not much is known about the role of school-related factors for health and risk behaviour (Gillander Gadin & Hammarström 2002). The importance of several aspects of the school context (e.g. the organisational structure or the psychosocial climate of the school) were analysed primarily in the context of improving academic achievement (Paulus 2002, Samdal et al. 2004). However, single studies showed that the psychosocial school environment (e.g. class/school climate and participation at school) is associated with smoking as well as other adolescent risk behaviours (Samdal et al. 2001, Dewey 1999). For example, Hu et al. (1998) showed that after adjustment for a number of socio-economic confounders, pupils with low school performance have a higher risk of daily smoking. Similar results are reported by McLellan et al. (1999), who showed that adolescents who have a negative perception of their school environment and who feel that their teachers are not supportive exhibit higher rates of risk behaviours. On the other hand, King et al. (1996) found that students who are satisfied with their school have a lower risk of regular smoking.

The initiation of relationships with peers is one of the most significant developmental tasks in adolescence (Pinquart & Silbereisen 2002). The importance of the peer group for the configuration of behavioural patterns probably increases by the same amount as the degree to which psychological and social detachment from the parents takes place. The time spent with peers continuously increases throughout adolescence. At the end of grade 10 up to 50% of daily time is spent with friends and

peers (Updegraff et al. 2001). Thus, it is plausible to assume that the peer group has a strong influence on the attitudes and behavioural patterns of young people. The peer group constitutes a social context that is highly relevant for adolescent risk behaviour. Integration into peer groups and the impact of peers represent two of the most important determinants of risk behaviour identified so far (Lösel & Bliesner 1998, Maggs & Hurrelmann 1998, Janin Jaquat et al. 2001).

Integration into a specific clique in which, for instance, substance use is seen as 'normal' behaviour can lead to opportunities for experimentation and action (Schwarzer 1996). Only if certain substances are available there are possibilities for consumption. For example, if close friends are smoking, it is likely that adolescents will also start smoking (Tyas & Pederson 1998, Carvajal et al. 2000). Furthermore, smoking peers facilitate access to cigarettes and influence perceptions about the diffusion of tobacco use and tobacco-related norms and values (Richter & Settertobulte 2003). The influence of the peer group appears to manifest itself in respect to alcohol as well. This is not surprising, as most of the situations in which young people drink alcohol are social situations (Schmid 2001). Though it is assumed that peers act as relatively efficient role models or that substance use is initiated through active offers from friends. It is also possible to assume the opposite direction, namely that risk-taking adolescents are specifically searching for corresponding environments. In general, it is assumed that, given certain premises, the influence of the peer group can lead to a strengthening of personality and thus to a positive development of health as well as to a higher risk (Lösel & Bliesener 1998). For example, a lack of peer acceptance, not finding a corresponding position in the group, or the hierarchical structure of the group itself might result in psychosocial distress that, again, could increase the risk of risk behaviours or negative mental health.

2.4 Consequences of risk behaviour

For most adolescents, as outlined in chapter 2.2, temporary risk behaviour can fulfil elementary functions needed to cope with the developmental tasks they are faced with. Thus, in terms of health, well-being and future life, risk behaviour presents chances as well as risks for adolescent development. In general, risk behaviour is related to health in several ways. From a long-term perspective, the trajectories for a long and healthy life are established in childhood and adolescence. Early developmental deficits, established behavioural patterns and adverse health can increase the risk of chronic disease and a low quality of life in adulthood (Davey Smith 2008). Focussing on current health in adolescence it is remarkable to see that the primary risks of adolescent morbidity and mortality originate from preventable risk behaviours (Kulbock & Cox 2002, Omori & Ingersoll 2005). Risk behaviours play a significant role especially in regard to non-medical causes of death (such as accidents and suicide). While these are rare cases, risk behaviour also contributes significantly to other aspects of health and well-being. A psychosocial understanding of risk behaviours requires attention to all their potential outcomes or consequences, not just those that are biomedical.

In contrast to the comprehensive theoretical and empirical work on the potential long-term consequences of risk behaviour in adolescence, short-term, non-medical consequences have rarely been the focus of academic interest (Maggs & Hurrelmann 1998, Richter & Settertobulte 2003). This shortcoming is quite remarkable in view of the increasing prevalence of risk behaviour, the radicalised onset of drinking and the increased risk-taking and hedonism of the 1990s. Risk behaviour normally decreases in early adulthood when adult roles and associated responsibilities are inherited (Pinquart & Silbereisen 2002). Thus, the health-related consequences for young people are mostly short-lived. However, some adolescents who show regular, established patterns of risk behaviour – and not experimental behaviour – have a higher risk of adverse health.

Risk behaviour is most precarious when it occurs very early in life or in combination with other risk behaviours and when it becomes an instrumental habit that leads to early limitation of behavioural patterns needed to cope with developmental problems. Here, environmental demands are evaded with the help of risk behaviour, thus giving rise to an illusion of freedom and independence.

Several studies showed that regular risk behaviour is associated with a variety of undesirable health outcomes (Boreham et al. 1999, Geckova 2002, Holmen et al., 2000; Chiolero & Schmid, 2002). Avoidable risk behaviours such as substance use, unhealthy nutrition, low levels of physical activity, readiness to use violence and risk behaviour in traffic significantly contribute to adolescent morbidity (Boreham et al. 1999, Holmen et al. 2000, Kulbok & Cox 2002, Richter & Settertobulte 2003). For example, regular and excessive use of alcohol and tobacco, especially in adolescence, can contribute to severe developmental disorders; physiological effects as well as organic harm occur much faster than they do among adults. Also, the time span from abuse to addiction is much shorter in adolescence (Settertobulte et al. 2001).

In respect to adolescents, however, the fact that most of the well-known determinants of health in adulthood have had little time to develop their health damaging effect in adolescence presents a challenge. But this challenge concerns mostly the physical and less so the psychosocial aspects of health. For example, close associations are also found with psychosocial health. Various international studies also showed that bullying is independently associated with several health-related disorders (e.g. fear, depression, overweight, low self-esteem and psychosomatic complaints) (Forero et al. 1999, Kumpulainen et al. 1999). In addition, biological risk factors such as blood pressure and hypercholesteremia also play a significant role. There is evidence that these factors have already had a certain level of health-compromising effects in adolescence and that they can predict future risk in adulthood (Lenthe et al. 2001, Barnekow-Berkvist et al. 2001).

However, many adolescents think of their own health as an inexhaustible good since many risk behaviours do not show their health-damaging effect until later in life (Kuntsche 2002). Risk assessments of potential damage to the health are inconsistent with the strong contem-

porary relevance of adolescent life. Direct experience, expectations of positive effects as well as situational advantages have a stronger relevance for adolescents (Raithel 1999, 2004).

3 Material and methods

3.1 Research context

Over the last 30 years, research on adolescent risk behaviour in Germany has been largely based on studies in high-risk populations or small, homogenous samples (Lampert & Thamm 2007, Richter & Leppin 2008). At best, existing studies contained brief ideas about the distribution and patterns of risk behaviour, either because they were based on small case numbers and regional samples at the community/city level or because they contained no data on trends. Interestingly, the last five years have witnessed an upsurge in surveys on adolescent health and health behaviour. Today, four large surveys are addressing risk behaviour during adolescence in Germany. The 'Drug Affinity Study' (Drogenaffinitätsstudie) of the Federal Centre for Health Education, the German 'Health Interview and Examination Survey for Childern and Adolescents' (KiGGS) of the Robert Koch-Institute, the 'European School Survey Project on Alcohol and Other Drugs' (ESPAD) and the 'Health Behaviour in School-aged Children' (HSBC) study.

Each survey stems from a different research context and addresses different aspects of health and risk behaviour. So far, international comparisons are only possible with the ESPAD and the HBSC surveys as they are being conducted in a number of countries using identical research protocols. Trend data are available only from the Drug Affinity study and the HBSC survey. On the other hand, representative data on the various social contexts of adolescent health and behaviour are available only from the HBSC and the KiGGS survey. Thus, the HBSC survey, which is used in this study, is the only survey that provides representative data on health and risk behaviours in adolescence as well as

their social contexts from a comparative perspective over time and across countries. The following chapters present the technical background of the study. It describes the data and data collection procedures, samples, measurements as well as the statistical analyses used.

3.2 The "Health Behaviour in School-aged Children (HBSC)" study

The Health Behaviour in School-aged Children (HBSC) study is a cross-national research study conducted by an international network of research teams in collaboration with the WHO Regional Office for Europe (Currie et al. 2004, 2008a, Richter 2008). The study aims at gaining new insight into and increase the understanding of young people's health, well-being and risk behaviours. It is a unique cross-national study since in addition to monitoring young people's health and health behaviour over time and across countries it also encompasses the wider context of health. This includes investigation of the family, school and peer settings as well as the socio-economic environment in which young people grow up in order to understand what factors shape and influence their health and risk behaviour (Currie et al. 2009).

The HBSC study was initiated in 1982 by researchers from Finland, Norway and Austria (Aarø et al. 1986, Currie et al. 2009). The growing interest in the study of adolescent health and an appreciation of the value of cross-national comparisons, specifically the HBSC network, has led to an increase in country-based research teams applying to join the network and participating in cross-national surveys (Currie et al. 2004). The international HBSC research network is multidisciplinary, with members coming from the fields of sociology, public health, paediatrics and psychology. Other members have a policy development background. Thus, the approach to study development has involved a cross-fertilisation of a range of perspectives. While the overall aim of the study has been to increase understanding of adolescent health, there has been emerging emphasis on the determinants of health, particularly in

the contexts of young people's lifes. The evidence produced by the HBSC study is therefore able to inform a wide range of policy and practice agendas.

3.3 Data collection procedures and samples

HBSC data are collected through school-based surveys using a common research protocol in all participating countries (Roberts et al. 2009). The HBSC survey instrument is a standard questionnaire developed by the international research network and used by all participating countries. The target population of the HBSC study are young people attending school at the ages of 11, 13 and 15. These age groups represent the onset of adolescence, a time when young people face the challenges of physical and emotional changes and important life and career decisions are beginning to be made (Currie et al. 2004).

The administration of the questionnaire in schools is conducted according to the standard guidelines from the survey protocol (Currie et al. 2008a). In some countries this is done by school teachers, while in others it is done by professional field workers, or members of school health teams. The process of data coding and entry also takes place at national level, according to agreed procedures and the national datasets are submitted along with complete documentation of the procedures adopted, as well as any deviations, to the international data bank at the University of Bergen/Norway. The Norwegian Social Science Data Service (NSD) performs cleaning and data quality checks under the supervision of the data bank manager, and they produce the full international dataset available for use by members of the research network.

Different samples of the HBSC survey were used in the study:

1. International data from the 2001/02 HBSC survey,
2. Data from the German HBSC survey in 2001/02 and
3. Trend data from the Northrhine-Westphalian HBSC survey in 1993/94, 1997/98 and 2001/02.

A brief description of these samples is given in the following paragraphs.

3.3.1 International data

International data were obtained from the HBSC study in 2001/2002. This survey included a total of 35 countries from Europe, North America and Israel. Students are selected using a clustered sampling design where the initial sampling unit is the school class. However, some adaptation in sampling occurs due to differences in the school systems across countries. The recommended minimum sample size for each country was 1536 students per age group to assure a 95% confidence interval of +/- 3% for prevalence estimates. The data were collected by means of standardized questionnaires administered in school classrooms according to the international protocol. The response rate at the level of the school was in general high, with a majority of countries above 80%. Separate studies cover the Flemish and French speaking populations in Belgium, and separate studies are also being undertaken for England, Scotland and Wales in the UK (see Table 1). A regional sample was selected in Germany (Northrhine-Westphalia, Hesse, Berlin and Saxony). Ethical approval for each national survey was obtained in conformity with the national guidance and regulation in place at the time of data collection.

Table 1: HBSC survey 2001/02: number of respondents by country, gender and age group

Country	Gender		Age group			
	Boys	**Girls**	**11**	**13**	**15**	**Total**
Austria	2241	2231	1590	1584	1298	4472
Belgium (Flemish-speaking)	2996	3293	2153	2106	2030	6289
Belgium (French-speaking)	2069	2254	1439	1503	1381	4323
Canada	1996	2365	1641	1513	1207	4361
Croatia	2180	2217	1451	1500	1446	4397
Czech Republic	2412	2600	1691	1661	1660	5012
Denmark	2259	2413	1710	1582	1380	4672
England	2943	3138	2239	2069	1773	6081
Estonia	1983	1996	1288	1424	1267	3979
Finland	2713	2675	1911	1732	1745	5388
France	4054	4131	2671	2900	2614	8185
Germany	2786	2864	2100	1801	1749	5650
Greece	1870	1937	1252	1231	1324	3807
Greenland	386	505	295	356	240	891
Hungary	1848	2316	1371	1463	1330	4164
Ireland	1302	1573	1012	944	919	2875
Israel	2625	3036	1892	2202	1567	5661
Italy	2125	2261	1524	1633	1229	4386
Latvia	1633	1848	1195	1169	1117	3481
Lithuania	2887	2758	1867	1873	1905	5645
Macedonia, TFYR	2053	2108	1348	1401	1412	4161
Malta	905	1075	619	694	667	1980
Netherlands	2120	2149	1477	1519	1273	4269
Norway	2554	2469	1660	1739	1624	5023
Poland	3204	3179	2100	2131	2152	6383
Portugal	1419	1521	1174	964	802	2940
Russia	3752	4285	2522	2940	2575	8037
Scotland	2246	2158	1743	1512	1149	4404
Slovenia	1996	1960	1474	1413	1069	3956
Spain	2873	2954	2105	1966	1756	5827
Sweden	1978	1948	1499	1201	1226	3926
Switzerland	2309	2370	1468	1671	1540	4679
Ukraine	1893	2197	1192	1297	1601	4090
United States	2322	2703	1479	1921	1625	5025
Wales	2004	1883	1351	1372	1164	3887
Total	**78936**	**83370**	**55503**	**55987**	**50816**	**162306**

Source: Currie et al. (2004)

3.3.2 German data

Germany has been a member of the HBSC network since 1994 (Richter 2003, 2008). The first two surveys (1994 and 1998) were limited to the federal state of Northrhine-Westphalia. The study in 2001/02 was also conducted in the federal states of Hesse, Berlin and Saxony. Students were selected using a clustered sampling design. Schools were sampled randomly using a list of public schools in the four federal states stratified by type of school and administrative district. Pupils from grades 5, 7, and 9 representing the age groups of 11, 13, and 15 were included in the study. The total sample included 5650 students (see Table 2). Data were collected by means of a standardised questionnaire based on the international protocol. Teachers administered the questionnaires in the classroom and were instructed to answer questions about the procedure only. Only students whose parents had signed an informed consent form were included in the study. The study was approved by the federal data protection commissioner in each state.

Table 2: German sample of the HBSC study 2001/02 by federal state, gender and grade

	Total	Boys	Girls
Federal state	**n**	**% (n)**	**% (n)**
Northrhine-Westphalia	3339	58.4 (1626)	59.8 (1713)
Hesse	1081	19.3 (539)	18.9 (542)
Saxony	681	12.5 (347)	11.7 (334)
Berlin	549	9.8 (274)	9.6 (275)
Grade			
Grade 5 (mean age 11.56)	2100	50.5 (1061)	49.5 (1039)
Grade 7 (mean age 13.63)	1801	48.9 (880)	51.1 (921)
Grade 9 (mean age 15.65)	1749	48.3 (845)	51.7 (904)
Total	**5650**	**49.3 (2786)**	**50.7 (2864)**

Source: Richter et al. (2003)

3.3.3 Northrhine-Westphalian data

The trend analyses are based on data from the HBSC surveys conducted in Northrhine-Westphalia in 1994, 1998 and 2002. All the surveys used identical protocols considering target group, sampling and data collection. In each of the four waves the sample was drawn by systematic cluster sampling, stratified by administrative district and type of school. The numbers of sampled schools were 81 in 1994, 62 in 1998 and 119 in 2002. The fieldwork took place in early springtime of each survey year. The total numbers of pupils participating in the surveys in 1994, 1998 and 2002 and providing usable data were 3275, 4784 and 3338, respectively. The age and sex distribution of participants was similar in all three surveys. Table 3 shows the characteristics of the three different samples.

Table 3: Northrhine-Westphalian samples of the HBSC study by survey year, gender and age group, 1994-2002

	1994				1998				2002			
	Boys		Girls		Boys		Girls		Boys		Girls	
	n	%	n	%	n	%	n	%	n	%	n	%
Total	**1605**	**49.0**	**1670**	**51.0**	**2439**	**51.0**	**2345**	**49.0**	**1626**	**48.7**	**1712**	**51.3**
Age												
11-year olds	555	34.6	549	32.9	819	33.6	756	32.2	596	36.8	609	35.7
13-year olds	535	33.3	586	35.1	820	33.7	791	33.7	514	31.8	545	31.9
15-year olds	515	32.1	535	32.0	796	32.7	799	34.1	508	31.4	553	32.4

Source: Richter & Leppin (2007)

3.4 Instrument and variables

The HBSC survey includes very comprehensive and detailed questions about different aspects of health, risk behaviours and living conditions in adolescence. One of the major advantages of the HBSC Study is the availability of a broad spectrum of widely tested and validated indicators that also contribute to the development of theory within the context of a *social* analysis of health. The variables and items included in the HBSC study are chosen on the basis of the overall objectives of the study and the scientific rationale underlying their use. Questions are subject to both piloting and pre-testing at international and national level prior to the main survey. The international questionnaire is comprised of both mandatory items, which are employed in all participating countries, and optional items, which are included by sub-sets of countries based on national interest, need and expertise.

The core questionnaire contains questions in the following areas:

- Socio-economic background (e.g. family affluence, parental occupation, perceived family wealth, type of school, ethnicity)
- Subjective health (e.g. self-rated health, psychosomatic complaints, obesity, mental health, life satisfaction)
- Injuries and violence (e.g. injuries, physical fighting, bullying)
- Substance use (tobacco, alcohol, drunkenness, illegal drugs)
- Eating habits und weight control behaviour (breakfast consumption, food frequency, body image, weight control behaviour)
- Physical activity (physical activity, sedentary activity: television and computer use)
- Family (e.g. family structure, parental support, family climate and communication)
- School (e.g. academic achievement, classmate support, satisfaction with school, school-related stress)
- Peer and leisure activities (number of close friendships, peer contact frequency, media use, peer group activities)

The following chapters present an overall picture of the central variables used in the study. In contrast to risk behaviour, the measurement of socio-economic position still represents an academic challenge. In the present study new approaches to conceptualise and measure socio-economic status in adolescence were developed and implemented. Therefore, special attention will be paid to this issue and details elaborated on. Further information on the questionnaire and the indicators can be found elsewere (Richter 2003, 2008).

3.4.1 Risk behaviour

Several risk behaviours that cover different behavioural dimensions are included in this study: regular smoking, drunkenness, weekly alcohol use, lifetime and 12-month prevalence of cannabis use, breakfast consumption, consumption of fruits and vegetables as well as sweets and soft drinks, physical activity, sedentary behaviour (e.g. watching television), weight-control behaviour and bullying. These variables cover behaviours that begin to develop in adolescence (e.g. substance use and bullying). They also cover risk behaviours that are mainly learned in early childhood and even in adolescence are influenced by parents to a large extent (e.g. nutrition and physical activity).

3.4.2 Parental and 'own' socio-economic status

In the case of adults, socio-economic status is usually measured by income, education or occupation (Richter 2005, Lampert et al. 2006, Currie et al. 2008b, Lahelma et al. 2008). Adolescents themselves have little economic power, are still in school and lack occupational status, as normally they do not participate in the labour market. Most often, the SES of the father, mother or head of the household is the proxy applied to adolescents (Lampert et al. 2006, Currie et al. 2008b). However, data on family SES can be difficult to collect from young people because they do not know or are not willing to reveal such information – resulting in

non-response on parental occupation varying from 20% to 45% across studies (Currie et al. 1997, Molcho et al. 2007, Wardle et al. 2002).

Additionally, bias has been reported in the form of greater non-response in low socio-economic groups (Lien et al. 2001, Wardle et al. 2003). The HBSC study addressed this issue and developed a measure of adolescent socio-economic circumstances that is easily completed in a self-report situation and enables researchers to address the issue of material affluence in children's surveys (Currie et al. 2008b).

- *Family affluence*

Currie et al. (1997) used the concept of material conditions in the family as a basis on which to select items for the Family Affluence Scale (FAS). In particular, the work of Townsend (1987) and Carstairs and Morris (1991) was drawn upon. Townsend's concept of material deprivation was based on the notion that material standards ordinarily available in society are lacking, but in the case of FAS both ends of the scale are considered – the more affluent as well as the deprived. Items selected for FAS met the following criteria:

- Items should be simple to answer, non-intrusive and non-sensitive
- Multiple rather than single component items should be used
- Items should be relevant to contemporary economic circumstances
- There should be the potential to create a common set of indicators for future cross-national HBSC surveys

The family affluence scale consists of four different items that reflect family expenditure and consumption. Possession of these items is considered to reflect affluence and their lack, in contrast, material deprivation: 'Does your family own a car?' (0, 1, 2 or more), 'Do you have your own bedroom for yourself?' (no=0, yes=1), 'How many times did you travel away on holiday with your family during the past 12 months?' (0, 1, 2, 3 or more), 'How many computers does your family own?' (0, 1, 2, 3 or more). The FAS has been utilised in different ways for different analyses. The full composite scale has been used as a continuous variable in a number of analyses focussing on health gradients

(for example: Currie et al. 1997; Torsheim et al. 2004; Elgar et al. 2005; Pickett et al. 2006; Torsheim et al. 2006). However, more frequently FAS has been recoded to create low, middle and high affluence groups, and in some cases the sample was split into tertiles in order to examine the effect of a relative or approximate SES position that more easily corresponds to classical SES groupings (Griesbach et al. 2003, Holstein et al. 2004, Inchley et al. 2005, Due et al. 2005, Vereecken et al. 2005, Boyce et al. 2006, Maes et al. 2006). This approach was further developed and implemented in several of the individual papers summarised here (Richter & Lampert 2008a, Richter & Leppin 2007, Richter et al. 2006, Richter et al. 2009a, 2009b).

There are several studies of FAS that suggest acceptable validity (Currie et al. 2008b). Boyce et al. (2006) showed that FAS aggregated at the country level correlated strongly with the national wealth indicator Gross Domestic Product. Andersen et al. (2008) showed a high degree of agreement between 11-year old schoolchildren's response to the four FAS items and their parents' reports. These findings were robust across six countries. Molcho et al. (2007) showed high correlations between the children's reports on FAS and their parents' occupational social class. Furthermore, there is strong consistency in the associations found between FAS and health outcomes across countries and between survey cycles. Nevertheless, FAS has limitations, some of which have been addressed and others that require future development.

- *Parental occupation*

Two open-ended questions were used to assess the parents' occupational status. Students were asked to indicate separately where their father and mother work and to describe what kind of job they do. Countries were required to condense the answers into a five-point social class scheme similar to the British registrar general's classification following standard guidelines for occupational coding. Information on the occupational status of the father and mother was combined, using the highest occupational status of both as the parental indicator. The original five categories were recoded into high (1 and 2), middle (3) and low (4 and 5) occupational status.

In addition, some studies show that indicators based on parental SES, like their occupational status or education, are less strongly associated with health and risk behaviour in adolescence (Lampert et al. 2006, Currie et al. 2008b). According to Haquist (2007), adolescence can be regarded as a period of development characterized by the search for and the gateway to an individual course of life (see also Friestad & Klepp 2006, Koivusilta et al. 2006). Accordingly, steering the focus of the analysis away from the socio-economic background towards the 'prospective' socio-economic status of the adolescents seems to be justified. Several researchers argue that alternative indicators such as self-reported socio-economic status, academic orientation/achievement or own educational status (e.g. type of school) are more appropriate ways to analyse and reveal health inequalities in this phase of life (Hagquist 2007, Vereecken et al. 2004, Koivusilta et al. 2006, Bergström et al. 1996, Lampert et al. 2006, Currie et al. 2008b).

- *Type of school*

The type of school has been included as an indicator of the students' own SES. Because of the different types of schools in Germany it was only possible to differentiate between grammar school and other school types. With respect to the Northrhine-Westphalian data it was also possible to perform a separate analysis of the four types of schools at the secondary level: secondary general school (Hauptschule), intermediate school (Realschule), and grammar school (Gymnasium) as well as comprehensive school (Gesamtschule).

- *Academic achievement*

As indicated above, several authors have argued that it is probably better to focus on the adolescents' academic orientation or their current school achievement. Such a concept can be seen as a rough indicator of the prospective socio-economic status (Hagquist 2007, Piko & Fitzpatrick 2007, Koivusilta et al. 2006). In relation to the assessment of their own

school achievements the pupils were asked: 'In your opinion, what do/does your class teacher(s) think about your school performance compared to your classmates.' (Response options: 'very good', 'good', 'average', 'below average').

3.4.3 Peer and school factors

- *School factors*

The HBSC study assesses various elements of the psychosocial school environment and school adjustment (Samdal et al. 2001). Previous studies have shown that these variables are associated with various measures of health and health behaviour (Currie et al. 2004, 2008a). Furthermore, available studies on the validity of the indicators also suggest that they have an acceptable reliability and validity (Haugland & Wold 2001, Hetland et al. 2002, Boyce et al. 2006, Schnohr et al. 2008, Ravens-Sieberer et al. 2008, Molcho et al. 2007, Andersen et al. 2008, Currie et al. 2008a). The following variables were used in the study: perceived quality of teaching, student autonomy, demands at school, classmate support, satisfaction with school, scholastic competence, and school-related stress.

- *Peer factors*

Peer influence was assessed with the help of three main indicators: Size of the friendship group, frequency of contacts with friends and contact via electronic media. In addition, the quality of relations with the best friend was included in the study as a measure of qualitative social support. It is assumed that a high level of 'peer exposure' is closely related to various risk behaviours. For example, opportunities will be created with the presence of substance-using peers, without them consumption would never have taken place.

3.4.4 Health outcomes

Looking at adolescent health always reveals a remarkable finding. On the one hand, adolescence is one of the healthiest periods in life in terms of mortality and morbidity. On the other hand, when subjective measures of health such as self-rated health or psychosomatic complaints are used, a high prevalence of adverse health becomes obvious (Ravens-Sieberer et al. 2001, Richter 2005). They are not primarily life-threatening, but they can compromise one's well-being and quality of life. Overall, health is more than just mortality and illness. Therefore, it is applicable to focus on self-reported psychosocial health – especially in adolescence. Overall, four measures of health that cover different dimensions of subjective health were used in the study: self-rated health, life satisfaction, Body-Mass-Index (BMI) and subjective health complaints that include somatic symptoms like headaches or backaches and psychological symptoms such as nervousness or irritability. Research shows that these are more appropriate measure of adolescent health than traditional morbidity and mortality measures (Ravens-Sieberer et al. 2003). Table 4 summarises the different measures used throughout this study.

Table 4: Variables used in the analyses

Topic areas	Variables
Background variables	Age Sex
Socio-economic indicators	Family affluence Parental occupation Type of school Academic achievement
Risk behaviours	Tobacco use Alcohol consumption Drunkenness Cannabis use Bullying Breakfast consumption Fruit consumption Soft drinks consumption Vegetable consumption Television viewing
Factors involved in explanation	School: Quality of teaching Satisfaction with school Student autonomy Demands at school Perceived academic achievement School-related stress Classmate support Scholastic competence Peers: Number of close friends of the same and other gender Time spent with friends after school and in the evening Communication with friends via electronic media Quality of relations with best friend
Health indicators	Self-rated health Life satisfaction Health complaints Overweight and obesity

3.5 Statistical analyses

Several techniques have been used to analyse the data in this study. Most of them used statistical software package SPSS, version 13 or higher as well as Stata Statistical Package, version 8.2 (Stata Corporation, College Station, Tex). This section will briefly list the different methods used to answer the respective research questions.

Age and gender differences and patterns of adolescent risk behaviour

Gender and age differences in risk behaviours in Germany, across countries and over time as described in chapter 4.1, were tested by t-test for continuous and chi-square for dichotomous variables. Time trends in risk behaviour were estimated with the help of logistic regression models. The survey year was included in the model as a series of dichotomous 'dummy' variables.

Socio-economic determinants and patterns of adolescent risk behaviour

Chi-square tests and logistic regression analyses were used to analyse the relationship between risk behaviour and socio-economic status (chapter 4.2). Results of the regression models are presented as odds ratios with 95% confidence intervals. The highest socio-economic group served as the reference category, with odds ratios being computed for the other groups in comparison. All analyses were done separately for both genders. Furthermore, a series of logistic regression models were used to assess the independent relationship between the four different SES indicators (family affluence, parental occupation, type of school, academic achievement) and various risk behaviours.

As for trend analyses, differences in smoking according to family affluence and type of school were analysed for the total sample as well as for each period separately (1994, 1998 and 2002). In addition, time trends were computed for each category of family affluence and type of school in order to estimate for each group whether there had been any significant changes from 1994 to 1998, 1998 to 2002 and over the whole time span from 1994 to 2002. Two different methods were used for in-

ternational comparisons: First, logistic regression analyses that included both SES indicators (family affluence and parental occupation) simultaneously were used to investigate the independent effect of both indicators on different risk behaviours across countries. Analyses were conducted for each country separately. Second, we also calculated multilevel logistic regression models for each of the behaviours to examine whether they were related to family affluence. Following previous HBSC analyses, it was decided to use a two-level model (countries/pupils) without school/class as an additional level of analysis. The variation by country was expressed as variance partitioning coefficient or, respectively, intraclass correlations (ICC).

The role of social context for adolescent risk behaviour

In chapter 4.3 a series of logistic regression models were calculated in order to assess the association between socio-economic status and risk behaviour (i.e. tobacco use) in relation to peer and school factors. First, separate bivariate logistic regression models adjusted for age were used to assess the association between the different peer and school variables. All peer and school factors were coded as dummy variables. Each variable that was significant in the bivariate analyses ($p<0.05$) was included in one of two blocks (block 1: school and block 2: peer group) on which separate multiple logistic regression models were conducted. Variables that were significant in the blocked analyses were included in the final multiple model that also included family affluence and age using forward selection. The reduction of deviance after inclusion of a variable was used as the overall test for significance.

Consequences of adolescent risk behaviour

Cross tabulations and chi-square tests were calculated first in order to analyse the relationship between different forms of bullying and subjective health (chapter 4.4). Subsequently, multivariate logistic regression models adjusted for age were calculated. The three forms of bullying

were used as the dependent variables. The indicators of subjective health, substance use behaviours and family affluence were included in each model as dummy variables.

Multinomial logistic regression models together with interactions between them and gender or grade were used to explore the association between risk behaviour and overweight/underweight in relation to psychosocial and socio-economic factors. Multilevel logistic regression models were also used to analyse the association between risk behaviours and self-rated health as well as to quantify the contribution of behavioural factors to socio-economic differences in self-rated health.

4 Results of the empirical studies

The results of the empirical studies are presented in the following chapters. The section is divided up into four parts in keeping with the research questions. Chapter 4.1 presents age and gender-related differences and patterns of risk behaviour in adolescence. Next, the role of socio-economic status for adolescent risk behaviour is analysed (chapter 4.2). Chapter 4.3 studies the importance of different social contexts for adolescent risk behaviour as well as their role in the relationship between socio-economic status und risk behaviour. The section closes with an analysis of the potential consequences of adolescent risk behaviour in relation to age, gender and socio-economic status (chapter 4.4). Where applicable, the results are presented for Germany, across countries and over time.

4.1 Age and gender differences and patterns of risk behaviour in adolescence

There is still little knowledge about how many adolescents get involved in risk behaviour in Germany. Furthermore, comparable data across countries, including Germany, and trend data for many risk behaviours are still rare. This is especially true for early adolescence, i.e. the age group of 11- to 15-year olds. In this relatively short but sensitive period in life almost all risk behaviours show systematic changes according to age and gender. The following chapter presents the main findings from several single studies that address age and gender as important determinants of risk behaviour.

Age and gender differences in risk behaviour in Germany

The results of the HBSC study in 2002 in Northrhine-Westphalia showed that experiences with alcohol, tobacco and cannabis are common among 11- to 15-year olds (Leppin et al. 2005). Almost half the adolescents have already had experience with tobacco and alcohol, one quarter of all adolescents are already in touch with cannabis. This experience is restricted in many cases to experimental or trial consumption that can be described as 'normal' in adolescence. Almost 80% of all adolescents reported that they do not smoke at present and 70% had never been drunk. However, there is a group of adolescents that regularly drinks alcohol (14%) and/or smokes tobacco (15%) before reaching legal age. It is remarkable that the prevalence of regular tobacco consumption increased drastically with increasing age.

At the age of 15 about one-third of the students smoked at least once a week (Table 5). No significant gender differences emerged in this connection. The large majority of 15-year old smokers smoked daily. In comparison to tobacco use, there were clear differences in the regular consumption of alcohol to the disadvantage of boys. These gender differences increased with increasing age. At the age of 15 the prevalence of regular alcohol use for boys was much higher than among girls. A similar picture was found for repeated drunkenness. In every age group boys reported episodes of drunkenness more often than their female peers. 43% of the 15-year old boys and 35% of the girls reported two or more episodes of drunkenness in their life. Regarding cannabis use, data were only measured among 15-year olds. About 18% of the boys and girls consumed cannabis at least once in the last year, with boys (22%) consuming cannabis significantly more often than girls (14%).

Table 5: Substance use according to age and gender, HBSC data: Northrhine-Westphalia 2001/02

	11-year olds		13-year olds		15-year olds		Gender-effect [1]
	♂	♀	♂	♀	♂	♀	χ^2, p
Tobacco use							
never	92,2	96,6	78,0	78,3	63,6	60,0	
less than weekly	4,2	2,2	8,3	7,5	4,8	8,0	ns
at least weekly	3,5	1,2	13,7	14,3	31,6	31,9	
¬ daily	1,6	0,2	10,0	10,7	24,9	27,1	
Alcohol use							
never	72,3	85,7	50,6	51,8	18,7	19,4	
less than weekly	23,2	12,9	38,4	39,1	41,1	55,4	$\chi^2 = 23,6$ p<0,001
at least weekly	4,5	1,3	10,9	9,1	40,3	25,2	
drunkenness							
never	87,9	96,0	74,0	75,7	41,0	46,6	
once	8,0	3,2	14,7	13,8	15,8	17,9	$\chi^2 = 25,6$ p<0,001
2 times or more	4,0	0,8	11,2	10,6	43,1	35,4	
Cannabis use (in the last year)							
never	-	-	-	-	77,6	86,5	$\chi^2 = 22,3$ p<0,001
at least once	-	-	-	-	22,4	13,5	

[1] Test for gender differences across all age groups

Source: Leppin et al. (2005)

Bullying represents another common risk behaviour in adolescence. In another analysis of the German HBSC data it was shown that the prevalence of bullying in all the subgroups analysed (bullies, victims, and bully/victims) was higher among boys than among girls, independent of age (Richter at al. 2007). The largest gender differences were found for bullies. The proportion of male students who bullied someone at least 2-3 times in the past couple of months increased continuously with age while an increase among girls was observed only from age 11 to 13. Among 15-year old girls the prevalence of bullying decreased again and was about half as high as the prevalence for boys. As for the victims of bullying, similar results were found for girls and boys: regardless of gender, 15-year olds showed the lowest prevalence of victims. In contrast, while the prevalence of students who were victims and perpetra-

tors at the same time increased with increasing age among boys, 11- to 13-year old girls showed, at about 3%, similar prevalences. Among 15-year old girls the already low prevalence continued to decline.

Age and gender patterns over time

As already indicated, the HBSC studies in Northrhine-Westphalia were already conducted in 1993/94 and 1997/98, so trend analyses were possible for some risk behaviours. The results show that from 1994 to 2002 regular smoking among 11- to 15-year old girls and boys increased in Northrhine-Westphalia (Leppin et al. 2005, Richter & Leppin 2007). While in 1994 the percentage of regular smokers was 11.2%, in 2002 15.2% of young adolescents reported smoking at least once a week (Table 6). The main increase – particularly in the case of girls – took place during the nineties. From 1998 to 2002 the prevalence of regular tobacco consumption increased by only one percentage point among boys and decreased by one point among girls.

Looking at separate age groups, it was found that among 15-year old boys the rates of regular tobacco consumption increased from 21% in 1993/94 to 32% in 2001/02. Girls also showed an increase, but the prevalences for 1997/98 and 2001/02 were very similar. For 13-year olds, who displayed a marked increase in regular tobacco consumption between 1993/94 and 1997/98, no pronounced increase was observed in 2001/02. In another analysis including the most recent HBSC data from 2006 it was found that a strong decrease in smoking rates became apparent in all age groups between 2002 and 2006 (Richter & Leppin 2008, Settertobulte & Richter 2007). In 2006, 8% of the boys and 10% of the girls were smoking regularly. Thus, for both genders the smoking prevalence in 2006 was lower than in 1994 (see Table 6).

Table 6: Regular tobacco use (at least once a week) among 11- to 15-year olds by gender from 1994 to 2006, percentages, odds ratios and 95% confidence intervals, HBSC data: Northrhine-Westphalia [1]

	Total (n= 15586)		Boys		Girls	
	%	OR (95% KI)	%	OR (95% KI)	%	OR (95% KI)
1994	11,2	1,00 [2]	9,7	1,00	12,7	1,00
1998	15,2	**1,44** (1,25-1,65)	14,4	**1,60** (1,30-1,96)	16,0	**1,31** (1,08-1,59)
2002	15,2	**1,51** (1,30-1,76)	15,2	**1,81** (1,44-2,25)	15,2	**1,29** (1,04-1,59)
2006	9,2	**0,75** (0,64-0,88)	8,4	0,81 (0,64-1,02)	9,9	**0,70** (0,57-0,87)

[1] logistic regression models, [2] reference group, **bold** = significant effect,

Source: Richter & Leppin (2008)

Similar to the figures for tobacco use, the rates of regular consumption of beer, wine/sparkling wine and spirits among 11- to 15-year olds increased during the 1990s (Leppin et al. 2005, Richter & Leppin 2008). However, the increase is significant only among boys, whereas the level of significance among girls was barely missed. The increase was most obvious among 15-year old boys. While in 1994 only 25% were drinking at least once a week, the rate increased to 37% in 2001/02. Girls also showed an increase, but the increase was less explicit. A clear decrease in consumption rates was observed from 2002 to 2006. In 2006 the rates for boys as well as girls were below those in 1994. In 2006, 9% of 11- to 15-year old boys and 5% of girls report drinking alcohol at least once a week (Table 7).

Table 7: Regular alcohol use (at least weekly consumption of beer, wine and spirits) among 11- to 15-year olds by gender from 1994 to 2006, percentages, odds ratios and 95% confidence intervals, HBSC data: Northrhine-Westphalia [1]

	Total (n= 15586)		Boys		Girls	
	%	OR (95% KI)	%	OR (95% KI)	%	OR (95% KI)
1994	9.4	1.00[2]	10.8	1.00	8.1	1.00
1998	11.4	**1.24** (1.06-1.45)	13.5	**1.33** (1.08-1.65)	9.2	1.13 (0.89-1.43)
2002	12.5	**1.47** (1.24-1.74)	15.3	**1.66** (1.32-2.08)	9.9	1.27 (0.98-1.63)
2006	7.1	**0.69** (0.58-0.82)	9.2	0.81 (0.64-1.02)	4.9	**0.54** (0.41-0.71)

[1] logistic regression models, [2] reference group, **bold** = significant effect,

Source: Richter & Leppin (2008)

Just as for regular alcohol consumption, a continuous increase in repeated drunkenness was observed from 1994 to 2002, regardless of gender. From 2002 to 2006 the rates fell again to the level of 1994. In 2006, 14% of the boys and 11% of the girls aged 11 to 15 reported at least two episodes of drunkenness. This corresponds to a decrease of four percentage points in each case since 2002.

The 12 month prevalence of cannabis use revealed the same pattern for boys as was already seen for the consumption of tobacco and alcohol (Leppin et al. 2005). From 1998 to 2002 the prevalence of cannabis consumption among 15-year old boys increased significantly from about 17% to almost 22%. The rates again decreased from 2002 to 2006, falling below the rates of 1998 (Richter & Leppin 2008). For girls a steady decrease from 15% in 1998 to 9% in 2006 was observed.

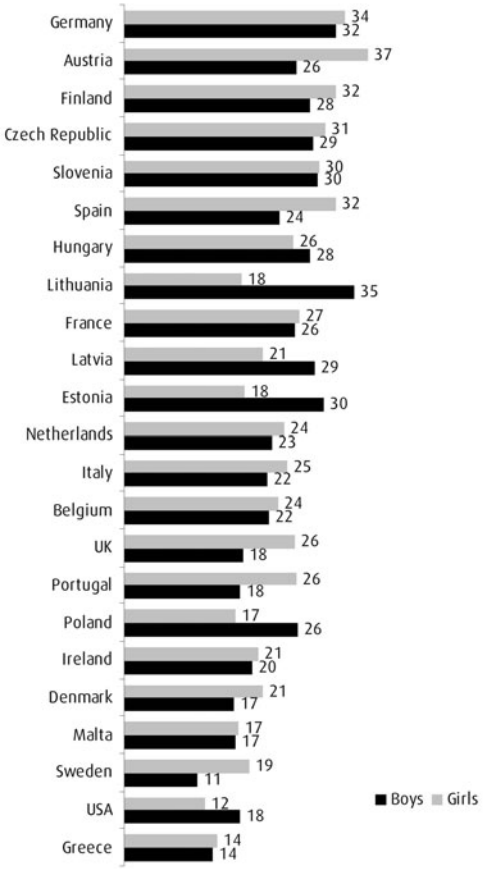
Age and gender patterns across countries

Data from the international HBSC study in 2002 showed that the prevalence of weekly tobacco consumption among 15-year olds ranged from 12% in the USA to 37% in Austria among girls and from 11% in Sweden to 35% in Lithuania among boys (Langness et al. 2005). German adolescents were among those students with the highest prevalence of regular tobacco smoking (Figure 4). Similarly high prevalences of smoking were reported in Austria, Finland, the Czech Republic, Slovenia and Spain. The lowest rates of regular smoking were found in Denmark, Sweden, the USA, Malta and Greece. It is remarkable that in most countries girls smoke more often on a regular basis than boys, particularly in Northern and Western Europe. Minor gender differences were found in Central and Southern Europe. In the Baltic States as well as Hungary, Poland and the USA more boys than girls report weekly smoking.

Large variations across countries were also found for weekly alcohol use (Langness et al. 2005). The rates of weekly alcohol consumption among 15-year old girls range from 10% in Poland to 48% in the UK and among boys from 18% in Finland to 56% in the Netherlands and Malta. Germany is located in the upper quartile: 33% of German girls and 46% of German boys drink alcohol at least once a week.[3] The Netherlands, Great Britain, Malta and Denmark showed the highest rates of regular alcohol consumption; on average, 40% of the adolescents consumed alcohol regularly in these countries. Relatively low rates were found in Latvia, the USA und Portugal. In all countries, significantly more boys than girls reported regular alcohol consumption. The gender-specific differences were particular large in the Southern European countries Italy, Greece, Malta and Slovenia as well as in Poland. Minor gender specific differences were found in Finland, Austria, Ireland and Latvia.

3 Deviations from the prevalences of regular alcohol use reported above are due to the use of another alcohol item.

Figure 4: Regular tobacco use among 15-year olds by country and gender (percentages), HBSC data: international 2001/02



Source: Langness et al. (2005)

In another study using the same data, the highest rates of episodes of drunkenness among 15-year olds were observed in Denmark, Wales, Greenland and England with rates of above 50% (Hurrelmann & Richter 2006). Germany is ranked in the upper third of the countries: 44% of 15-year old boys and 33% of the girls reported having been drunk two or

more times in life. The lowest rates for repeated drunkenness were found in the southern European countries. Across all countries boys are more likely than girls to report having been drunk two or more times (39.8% of boys vs. 31.4% of girls). Exceptions are Spain, Finland and Wales. The largest gender differences were found in the Eastern European countries.

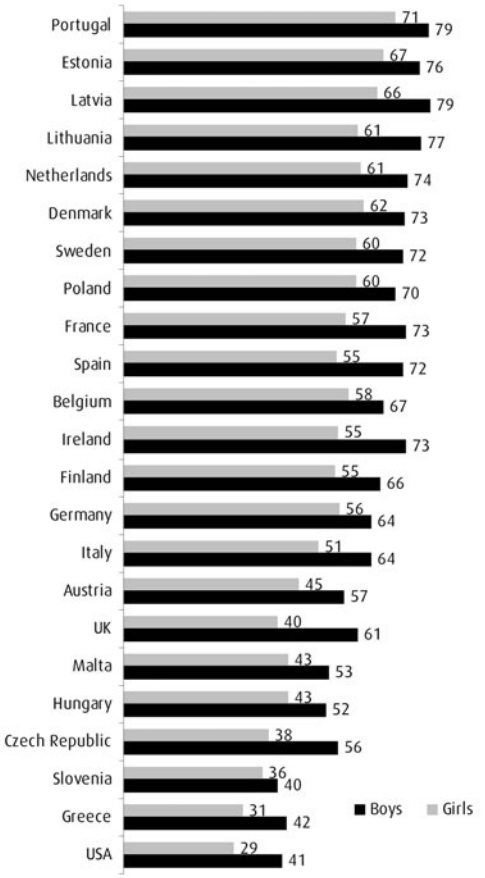
Regarding bullying, 13% of all 15-year old students reported they had bullied others at least 2-3 times a month during the past couple of months (Hurrelmann & Richter 2006). However, this overall percentage masks significant variation between countries. The rates range across countries from 3% to 41%. The following countries are in the top quartile for perpetrating bullying: Lithuania, Austria, Germany, Latvia, Ukraine and Switzerland. Countries in the lowest quartile are Ireland, Hungary, Wales, the Czech Republic and Sweden. Across all countries boys reported having bullied others significantly more often than girls. Even though the gender difference was more marked in some countries than in others, the stability of this pattern is striking.

In terms of physical activity prevalences also varied strongly between countries. The frequency of physical activity on five or more days a week ranged from 11% in France to 42% in the USA among girls and from 23% in Italy to 57% in the USA among boys. Once again, the results for Germany painted a negative picture: Only 18% of the girls and 29% of the boys reported regular physical activity, locating Germany in the lower third of all countries. The highest prevalence of high levels of physical activity was found in the USA, Ireland and Great Britain as well as in the Czech Republic, the Netherlands and Lithuania. Adolescents in Italy, France and Portugal had the lowest rates of physical activity. In general, boys were substantially more active physically than girls. The gender-related differences were extremely large in the UK, Ireland and Greece.

The prevalence of daily breakfast consumption ranged among girls from 29% in the USA to 71% in Portugal and among boys from 40% in Slovenia to 79% in Portugal and Latvia (Figure 5). Germany is located in the lower midrange of all countries. 56% of German girls and 64% of German boys report having breakfast every school day. The USA had the lowest rates of daily breakfast with only 29% of the girls and 41% of

the boys having breakfast every school day. In all countries more girls than boys leave for school without having breakfast. The lowest gender-related differences were found in Slovenia, Germany and Portugal, the highest differences in the UK, Ireland and the Czech Republic.

Figure 5: Daily breakfast among 15-year olds by country and gender (percentages), HBSC data: international 2001/02



Source: Langness et al. (2005)

4.2 Socio-economic determinants and patterns of adolescent risk behaviour

While the graded relationship between socio-economic status and health in adulthood has been the subject of intense research, few studies have analysed the association between risk behaviour and socio-economic position in adolescence. It is still unknown, for example, whether socio-economic differences in various risk behaviours exist among adolescents and whether certain behaviours are more strongly associated with SES than others. A further complication is that studies rarely examine a range of health behaviours but instead focus on a single behaviour. The following chapter presents the empirical findings of different analyses on socio-economic differences in various dimensions of risk behaviour.

Socio-economic differences in risk behaviour in Germany

Findings in different analyses of the Northrhine-Westphalian and German HBSC data from 2002 showed that parental occupation and family affluence were weakly associated with tobacco and alcohol use among 11- to 15-year olds (Richter & Leppin 2007, Richter & Lampert 2008a, 2008b). While the occupational status of the parents showed no significant effect among boys, the risk of weekly smoking increased slightly with decreasing occupational status among girls (Table 8 and 9). Regardless of gender, no significant association was found between family affluence and regular smoking. Regarding repeated episodes of drunkenness it was also found that both parental SES measures among boys as well as girls only have a comparative low relevance. The only exception was family affluence. Interestingly, boys with medium affluence show a significantly lower odds ratio (OR) for repeated drunkenness than boys with low and high affluence.

Table 8: Associations between SES indicators and tobacco use (at least once a week) among boys, odds ratios and 95% confidence intervals [1], adjusted for age, HBSC data: Germany 2001/02

Boys (n=2621)	Separate effects		Model 1 parental occupation + family affluence		Model 2: Model 1 + type of school		Model 3: Model 1 + academic achievement	
				OR (95% KI)				
Parental occupation								
high	1,00[2]		1,00		1,00		1,00	
medium	1,13	(0,82-1,56)	1,13	(0,82-1,56)	0,91	(0,65-1,27)	0,86	(0,61-1,21)
low	1,37	(0,99-1,89)	1,33	(0,95-1,88)	0,92	(0,64-1,31)	0,87	(0,60-1,24)
Family affluence								
high	1,00		1,00		1,00		1,00	
medium	1,05	(0,82-1,34)	0,98	(0,76-1,26)	0,88	(0,68-1,15)	0,87	(0,66-1,13)
low	1,37	(0,98-1,93)	1,19	(0,83-1,70)	1,02	(0,71-1,47)	0,98	(0,68-1,14)
Type of school								
grammar school	1,00				1,00		1,00	
other	**2,97**	(2,23-3,94)			**3,02**	(2,23-4,07)	**3,18**	(2,35-4,32)
Academic achievement								
very good/good	1,00						1,00	
average/bad	**2,03**	(1,59-2,59)					**2,15**	(1,67-2,75)

[1] logistic regression models, [2] reference group, **bold** = significant effect

Source: Richter & Lampert (2008a)

Table 9: Associations between SES indicators and tobacco use (at least once a week) among girls, odds ratios and 95% confidence intervals [1], adjusted for age, HBSC data: Germany 2001/02

Girls (n=2623)	Separate effects		Model 1 parental occupation + family affluence		Model 2: Model 1 + type of school		Model 3: Model 1 + academic achievement	
				OR (95% KI)				
Parental occupation								
high	1,00[2]		1,00		1,00		1,00	
medium	**1,44**	(1,04-2,00)	**1,40**	(1,01-1,97)	1,15	(0,82-1,63)	1,06	(0,75-1,50)
low	**1,61**	(1,16-2,24)	**1,53**	(1,08-2,18)	1,10	(0,76-1,60)	1,01	(0,69-1,47)
Family affluence								
high	1,00		1,00		1,00		1,00	
medium	1,18	(0,92-1,51)	1,07	(0,82-1,39)	0,95	(0,73-1,25)	0,93	(0,71-1,22)
low	**1,34**	(0,98-1,82)	1,15	(0,82-1,61)	0,89	(0,63-1,26)	0,86	(0,60-1,21)
Type of school								
grammar school	1,00				1,00		1,00	
other	**2,66**	(2,05-3,44)			**2,66**	(2,02-3,52)	**2,75**	(2,07-3,64)
Academic achievement								
very good/good	1,00						1,00	
average/bad	**2,15**	(1,68-2,74)					**2,16**	(1,68-2,77)

[1] logistic regression models, [2] reference group, **bold** = significant effect

Source: Richter & Lampert (2008a)

Comparably weak associations between parental SES and risk behaviour were also found in detailed analyses of various forms of bullying (Richter at al. 2007). Adjusted for several health and behavioural measures a significant association between family affluence and bullying was found only for bullies. Boys from low affluent families had significantly lower odds ratios for bullying others at least two or three times in the past

couple of months. For the other forms of bullying (i.e. being bullied, bully/victims) no significant association with family affluence was observed.

On the other hand, distinct socio-economic differences in regular tobacco and alcohol consumption were found for adolescents' 'own' social status, i.e. type of school and academic achievement (Richter & Lampert 2008a, Richter & Leppin 2007). Boys and girls who do not attend a grammar school or who report average or low academic achievement were respectively 3 or 2 times more likely to smoke tobacco at least once a week (Table 8 and 9). Among both genders the risk of repeated drunkenness increased by about 40% if the adolescent did not attend a grammar school. Low academic achievement increased the odds ratios by up to 1.8 among boys and 2.5 among girls. Using multivariate analyses including all four indicators (i.e. family affluence, parental occupation, school type and academic achievement) it was shown that type of school and academic achievement were independently associated with substance use – also in terms of parental SES.

While substance use measures and bullying revealed only weak associations with parental socio-economic status, a different picture was found for breakfast intake and excessive TV viewing (see Table 10 and 11 for TV viewing as an example). All four socio-economic indicators (family affluence, parental occupation, type of school and academic achievement) were significantly associated with irregular breakfast intake on schooldays among girls and boys. The occupational status of the parents and family affluence seem to play the same role as the school-related variables, or even a larger one. Independent of gender, the risk of excessive television viewing and having breakfast on an irregular basis increased with decreasing socio-economic status. The effects of type of school and academic achievement were substantial but lower than for tobacco and alcohol consumption. Multivariate analyses including all four SES measures indicate that almost all indicators were independently associated with breakfast intake and television viewing. Thus, family background, i.e. class-related measures seem to have the same impact on these risk behaviours as school-related measures.

Table 10: Associations between SES indicators and television viewing (4 or more hours on schooldays) among boys, odds ratios and 95% confidence intervals [1], adjusted for age, HBSC data: Germany 2001/02

Boys (n=2484)	Separate effects		Model 1 parental occupation + family affluence		Model 2: Model 1 + type of school		Model 3: Model 1 + academic achievement	
				OR (95% KI)				
Parental occupation								
high	1,00[2]		1,00		1,00		1,00	
medium	**1,83**	(1,36-2,48)	**1,74**	(1,28-2,36)	**1,49**	(1,09-2,03)	**1,47**	(1,04-2,07)
low	**2,59**	(1,92-3,49)	**2,20**	(1,61-3,01)	**1,63**	(1,18-2,26)	**1,68**	(1,17-2,40)
Family affluence								
high	1,00		1,00		1,00		1,00	
medium	**1,47**	(1,18-1,82)	**1,27**	(1,02-1,58)	1,18	(0,94-1,48)	1,18	(0,92-1,51)
low	**2,25**	(1,70-2,97)	**1,79**	(1,32-2,41)	**1,58**	(1,17-2,14)	**1,52**	(1,09-2,12)
Type of school								
grammar school	1,00				1,00		1,00	
other	**2,90**	(2,29-3,68)			**2,42**	(1,89-3,12)	**2,25**	(1,71-2,95)
Academic achievement								
very good/good	1,00						1,00	
average/bad	1,19	(0,92-1,36)					1,07	(0,86-1,34)

[1] logistic regression models, [2] reference group, **bold** = significant effect

Source: Richter & Lampert (2008a)

Table 11: Associations between SES indicators and television viewing (4 or more hours on schooldays) among girls, odds ratios and 95% confidence intervals [1], adjusted for age, HBSC data: Germany 2001/02

Girls (n= 2582)	Separate effects		Model 1 parental occupation + family affluence		Model 2: Model 1 + type of school		Model 3: Model 1 + academic achievement	
				OR (95% KI)				
Parental occupation								
high	1,00[2]		1,00		1,00		1,00	
medium	**1,68**	(1,20-2,35)	**1,57**	(1,11-2,20)	1,27	(0,89-1,80)	1,12	(0,78-1,64)
low	**2,56**	(1,84-3,55)	**2,10**	(1,48-2,98)	**1,53**	(1,06-2,19)	1,34	(0,90-1,99)
Family affluence								
high	1,00		1,00		1,00		1,00	
medium	**1,32**	(1,04-1,68)	1,14	(0,89-1,46)	1,03	(0,80-1,32)	1,06	(0,80-1,40)
low	**2,39**	(1,82-3,13)	**1,85**	(1,38-2,49)	**1,48**	(1,10-2,00)	**1,50**	(1,07-2,10)
Type of school								
grammar school	1,00				1,00		1,00	
other	**3,03**	(2,37-3,89)			**2,49**	(1,91-3,25)	**2,21**	(1,65-2,97)
Academic achievement								
very good/good	1,00						1,00	
average/bad	**1,53**	(1,24-1,88)					**1,33**	(1,05-1,69)

[1] logistic regression models, [2] reference group, **bold** = significant effect

Source: Richter & Lampert (2008a)

Trends in socio-economic differences in risk behaviour

The findings from the trend analysis of the Northrhine-Westphalian HBSC surveys in 1994, 1998, and 2002 supported the hypothesis of only minor socio-economic differences in substance use behaviours (Richter & Leppin 2007). Only in one of the three cohorts a significant effect of family affluence on regular smoking among 11- to 15-year olds

was found for boys in 1994 and for girls in 1998 (Table 12). Furthermore, when all cohorts were combined, low affluent boys as well as girls had slightly higher odds ratios for regular smoking than high affluent adolescents.

Table 12: Prevalence and trends of regular smoking (1994-2002) by family affluence among German girls and boys, Percentage, odds ratio (OR) and 95% confidence interval (95% CI) [1], HBSC data: Northrine-Westphalia

Survey year	All years		1994		1998		2002	
	(%)	OR (95% CI)	(%)	OR (95% CI)	(%)	OR (95% CI)	(%)	OR (95% CI)
Family affluence								
Boys								
high	13.5	1.00	8.5	1.00	14.9	1.00	16.0	1.00
medium	12.7	0.99 (0.82-1.19)	10.4	1.44 (0.95-2.17)	14.2	1.04 (0.79-1.37)	12.4	0.70 (0.50-0.99)
low	14.2	1.27 (1.03-1.56)	10.7	1.63 (1.04-2.54)	14.2	1.21 (0.89-1.66)	17.9	1.18 (0.83-1.68)
Girls								
high	13.9	1.00	11.8	1.00	14.8	1.00	14.4	1.00
medium	13.9	1.13 (0.94-1.37)	11.8	1.13 (0.77-1.65)	15.0	1.16 (0.87-1.54)	14.5	1.15 (0.81-1.62)
low	17.0	1.44 (1.18-1.75)	15.0	1.37 (0.93-2.02)	18.5	1.61 (1.20-2.17)	16.9	1.31 (0.92-1.86)

[1] logistic regression models adjusted for age

Source: Richter & Leppin (2007)

A completely different picture emerged when the type of school was used as a measure of the students' own SES (Table 13). A pronounced social gradient in regular smoking was observed for both genders and in each of the three cohorts. Particularly students from general schools faced an average risk of about 4 times that of the group with the highest educational level. But even students from intermediate and comprehensive schools had an elevated risk ranging from 2 to 3 on average. Overall, the general increase in regular smoking from 1994 to 2002 (see chapter 4.1) took place largely independent of family affluence and type of school. Smoking has generally increased in all socio-economic

groups – although there were differences in terms of degree and in regard to when such changes took place. The trend analyses showed that socio-economic differences in tobacco smoking remained largely unchanged over the 12-year period.

Table 13: Prevalence and trends of regular smoking (1994-2002) by school type among German girls and boys, Percentage, odds ratio (OR) and 95% confidence interval (95% CI) [1], HBSC data: Northrine-Westphalia

Survey year	All years		1994		1998		2002	
	(%)	OR (95% CI)	(%)	OR (95% CI)	(%)	OR (95% CI)	(%)	OR (95% CI)
School type								
Boys								
Grammar school	7.1	1.00	4.1	1.00	8.0	1.00	7.1	1.00
Intermediate school	11.6	1.77 (1.39-2.26)	8.0	2.07 (1.16-3.69)	12.2	1.42 (1.01-2.00)	14.6	2.57 (1.61-4.09)
Comprehensive school	15.4	2.43 (1.84-3.23)	15.0	4.00 (2.25-7.10)	18.3	2.46 (1.62-3.74)	12.6	1.97 (1.12-3.46)
General school	21.6	3.78 (3.03-4.71)	15.3	3.81 (2.25-6.45)	23.8	3.60 (2.65-4.88)	24.1	4.84 (3.19-7.35)
Girls								
Grammar school	7.8	1.00	7.1	1.00	8.2	1.00	8.0	1.00
Intermediate school	15.8	2.19 (1.76-2.73)	12.5	1.87 (1.21-2.90)	18.9	2.64 (1.92-3.62)	14.6	1.87 (1.22-2.86)
Comprehensive school	17.9	2.95 (2.24-3.89)	11.7	1.76 (1.03-3.00)	23.6	4.62 (3.03-7.07)	18.3	2.84 (1.76-4.58)
General school	24.0	4.00 (3.23-4.95)	23.0	3.83 (2.54-5.79)	25.5	4.13 (2.97-5.73)	23.3	3.96 (2.67-5.86)

[1] logistic regression models adjusted for age

Source: Richter & Leppin (2007)

Socio-economic differences in risk behaviour across countries

Analyses of socio-economic differences in various risk behaviours using the international HBSC dataset from 2001/02 supported the findings found in the German data. The results showed that after adjustment for age, gender and parental occupation, family affluence had almost no significant effect on regular smoking in the 28 countries included in the analysis (Richter et al. 2009b). In contrast, an increase in smoking with decreasing occupational status was found in half of the countries (Table 14). The large majority of these countries are Northern and Western European countries or new members of the European Union. No socio-economic differences appeared for Southern European countries. The association between weekly alcohol use and parental socio-economic status across countries was weak and inconsistent. In most countries no association was found for parental occupation, and in those few countries where an effect of family affluence was observed, adolescents from low and medium affluent family background had a lower risk of regular alcohol use than those from high affluent families.

Table 14: Associations between smoking (at least once a week) and socio-economic indicators among 13- to 15-year olds by country, unadjusted prevalence (%) and odds ratios (OR), HBSC data: international 2001/02 [a]

		Tobacco smoking					
		family affluence			parental occupation		
	Overall %	high	medium	low	high	medium	low
		OR	OR	OR	OR	OR	OR
Western European Countries (WEC)							
Belgium (Flanders)	15.3	1[b]	0.95	1.22	1	1.17	**1.54****
France	15.9	1	1.08	**1.35****	1	**0.72****	0.90
Germany	23.4	1	1.03	1.18	1	1.15	1.27
Ireland	13.4	1	1.28	1.13	1	**1.67****	**2.18*****
Scotland	13.3	1	1.07	1.37	1	1.14	**1.37***
Switzerland	15.5	1	0.79	1.07	1	1.13	1.38
Wales	15.7	1	1.22	1.37	1	1.24	**1.36***
Northern European Countries (NEC)							
Denmark	11.6	1	1.04	1.04	1	1.29	**1.61****
Finland	20.8	1	0.82	1.16	1	**1.40****	**1.55*****
Norway	14.5	1	0.93	1.03	1	1.17	**1.70****
Sweden	10.2	1	0.88	0.93	1	**1.72***	**1.81*****
Southern European Countries (SEC)							
Greece	9.0	1	0.97	0.97	1	1.09	1.06
Italy	14.3	1	0.80	1.08	1	0.81	1.03
Malta	14.2	1	1.02	1.01	1	0.79	1.14
Portugal	16.9	1	0.83	0.95	1	0.80	1.00
Spain	17.8	1	0.78	0.89	1	1.13	1.16
Central and Eastern European Countries (CEEC)							
Croatia	14.1	1	0.78	**0.66****	1	1.65	1.46
Czech Republic	20.3	1	1.00	1.04	1	**1.27***	**1.62*****
Estonia	16.9	1	1.02	1.20	1	1.12	1.19
Hungary	16.9	1	0.84	0.95	1	1.28	**1.53***
Latvia	17.6	1	1.05	1.00	1	0.78	0.84
Poland	15.6	1	1.17	**1.44****	1	**1.42***	1.25
Russia	16.9	1	0.95	0.91	1	1.06	**1.35****
Slovenia	15.5	1	0.86	0.95	1	**1.49***	1.28
Ukraine	22.4	1	1.00	0.86	1	1.23	**1.37****
North America							
Canada	10.1	1	0.86	1.35	1	1.36	**1.55***
USA	10.0	1	1.03	1.35	1	1.29	1.35
Israel	10.0	1	0.83	**0.72***	1	**1.43***	1.30

[a] logistic regression models adjusted for age, gender and both SES indicators respectively, [b]reference group, * p<0,05, ** p<0,01, *** p<0,001, **bold** = 95% CI does not include 1

Source: Richter et al. (2009b)

The results on regular alcohol use are confirmed by findings from a detailed study on socio-economic differences in episodes of drunkenness (Richter et al. 2006). In the case of girls, only in one out of 28 countries was a significant association between family affluence and repeated drunkenness observed after adjustment for age and each SES indicator respectively. In the case of boys, on the other hand, there was at least some evidence of socio-economic differences. Adjusted for parental occupation, it was found that boys from low and/or medium affluent families faced a lower risk of frequent drunkenness than boys from highly affluent families. Such effects occurred in only one-third of the countries. However, it should be noted that in the large majority of countries, trends for low affluent boys to be less at risk than high affluent boys became apparent, even if these did – sometimes barely – miss levels of significance. With regard to parental occupation there were also more associations with drunkenness for boys than for girls. Significant differences in episodes of drunkenness were found in nine countries for boys and in six countries for girls. Contrary to FAS, however, these effects indicated a higher risk in adolescents with parents of low or medium occupational status. Thus, while the risk of repeated drunkenness decreased with family affluence, the risk tended to increase with decreasing status of parental occupation. This was even true for countries that showed significant effects on both indicators.

A different picture was observed for socio-economic differences in vegetable consumption and television viewing (Richter et al. 2009a, 2009b). Family affluence as well as parental occupation were strong independent predictors of both outcomes. A significant social gradient for at least one SES indicator was observed in all countries showing a decreasing odds ratio for daily vegetable consumption with decreasing FAS or parental occupation (Table 15). In all countries the risk of watching television four hours or more a day increased with decreasing occupational status of the parents. Compared to parental occupation, family affluence had a weaker relationship with television viewing in terms of the effect size and the number of significant associations in countries.

Table 15: Associations between vegetable consumption (at least once a day) and socio-economic indicators among 13- to 15-year olds by country, unadjusted prevalence (%) and odds ratios (OR), HBSC data: international 2001/02 [a]

		Vegetable consumption					
		family affluence			parental occupation		
	Overall %	high	medium	low	high	medium	low
		OR	OR	OR	OR	OR	OR
Western European Countries (WEC)							
Belgium (Flanders)	52.9	1[b]	0.85	**0.67*** **	1	**0.66*** **	**0.59*** **
France	40.8	1	**0.87***	**0.71*** **	1	**1.24****	0.99
Germany	31.1	1	0.94	**0.80***	1	**0.82***	**0.79***
Ireland	39.7	1	0.95	**0.72****	1	0.88	0.95
Scotland	33.0	1	0.80	**0.61*** **	1	0.79	**0.71****
Switzerland	32.8	1	0.99	**0.68****	1	1.20	0.87
Wales	21.6	1	0.96	**0.73***	1	**0.53*** **	**0.50*** **
Northern European Countries (NEC)							
Denmark	26.6	1	**0.75****	0.82	1	**0.65*** **	**0.49*** **
Finland	20.6	1	**0.73****	0.79	1	**0.64*** **	**0.51*** **
Norway	20.1	1	**0.65****	**0.67*** **	1	**0.60*** **	**0.60*** **
Sweden	27.9	1	0.94	**0.73****	1	0.77	**0.70*** **
Southern European Countries (SEC)							
Greece	20.3	1	**0.73****	**0.56*** **	1	**0.72****	**0.61*** **
Italy	22.4	1	**0.66*** **	**0.44*** **	1	1.16	0.85
Malta	13.2	1	0.88	**0.59****	1	**0.59***	**0.53****
Portugal	23.5	1	**0.74***	0.88	1	0.76	**0.64****
Spain	9.4	1	1.03	0.81	1	0.88	**0.70****
Central and Eastern European Countries (CEEC)							
Croatia	21.8	1	0.88	**0.71****	1	0.85	0.98
Czech Republic	25.8	1	**0.77***	**0.70*** **	1	1.08	0.94
Estonia	13.4	1	0.99	0.86	1	1.05	**1.48****
Hungary	13.7	1	**0.63*** **	**0.50*** **	1	0.91	1.11
Latvia	27.4	1	0.87	1.00	1	1.27	1.04
Poland	34.4	1	0.96	**0.67*** **	1	0.86	0.87
Russia	35.4	1	**0.77*** **	**0.65*** **	1	0.94	1.13
Slovenia	24.7	1	0.89	**0.75****	1	0.78	0.89
Ukraine	44.4	1	0.99	**0.76****	1	1.01	1.06
North America							
Canada	38.6	1	0.93	**0.75****	1	**0.78***	**0.73****
USA	29.2	1	**0.83***	**0.68*** **	1	**0.82***	0.98
Israel	48.5	1	0.87	**0.83***	1	0.95	0.89

[a] logistic regression models adjusted for age, gender and both SES indicators respectively, [b]reference group, * p<0,05, ** p<0,01, *** p<0,001, **bold** = 95% CI does not include 1

Source: Richter et al. (2009b)

The consistency of the relationship between TV viewing, vegetable consumption and parental SES was underlined with results from a multilevel analysis (Richter et al. 2009b). Here, similarly consistent socio-economic differences across countries were also observed for physical activity, fruit consumption and, partly, breakfast intake.

4.3 The role of social contexts for adolescent risk behaviour

In the following chapter two important social contexts are included in the analysis of risk behaviour. While risk behaviour in childhood is highly influenced by the parents, the influence of peers and school increases with age. As outlined above, the decreasing influence of family background and increasing influence of determinants from other social contexts during adolescence might result in a homogenising effect of socio-economic differences in health and risk behaviour. It is likely that this is especially true of behaviours that start in adolescence (e.g. substance use) because they are less established, are more exposed to influences outside the family and can perform important functions in adolescent development. The following chapter explores what peer and school factors are associated with risk behaviour in adolescence and assesses their role in the relationship between age, gender, socio-economic status und risk behaviour – taking tobacco smoking as an example.

Using data from the German HBSC study in 2002 it was found that numerous school factors were significantly associated with regular smoking (Richter & Lampert 2008b). Adjusted for family affluence and other peer and school variables, self-reported academic achievement and teaching quality showed the strongest effects with smoking (Table 16). Boys and girls reporting low academic achievement and low levels of teaching quality were over two times more likely to smoke regularly than pupils with high academic achievement and those who report high teaching quality. Adolescents were also more likely to smoke regularly if they reported high demands at school and low scholastic competence. Boys and girls were also more likely to smoke at least once a week if they reported high levels of school-related stress and low satisfaction with school. Odds ratios were generally higher for boys than for girls.

Table 16: Associations between smoking and family affluence, peer and school factors among 11- to 15-year-old German students, odds ratios (OR) and 95% CI, HBSC data: Germany 2001/02

	Boys (n=1966)				girls (n=1980)			
	Model 1[1]		Model 2[2]		Model 1[1]		Model 2[2]	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Family affluence								
high	1,00[a]		1,00		1,00		1,00	
medium	1.10	(0.83-1.46)	1.16	(0.85-1.57)	1.22	(0.92-1.62)	1.19	(0.88-1.62)
low	1.36	(0.92-2.03)	1.25	(0.81-1.93)	**1.44**	**(1.02-2.04)**	**1.55**	**(1.06-2.25)**
School								
Teaching quality								
good			1.00				1.00	
medium			1.52	(0.97-2.38)			0.98	(0.64-1.51)
low			**2.44**	**(1.62-3.69)**			**1.87**	**(1.25-2.79)**
Academic achievement								
very good/good			1.00				1.00	
average/below average			**1.96**	**(1.45-2.65)**			**1.61**	**(1.21-2.16)**
Peers								
Peer contacts (after school)								
0-4 days			1.00				1.00	
5 or more days			**3.00**	**(2.20-4.09)**			**2.55**	**(1.89-3.44)**
Peer contacts (in the evening)								
0-4 days			1.00				1.00	
5 or more days			**1.85**	**(1.29-2.66)**			**1.85**	**(1.30-2.65)**
Number of close friends (other sex)								
0-1 friends			1.00				1.00	
2 or more friends			**1.81**	**(1.35-2.43)**			**2.87**	**(2.07-3.98)**
Electronic contact with friends								
3 or more days			1.00				-	
rarely/never			**0.61**	**(0.43-0.85)**			-	
Nagelkerkes R^2	0.17		0.33		0.23		0.37	

[1] logistic regression models, adjusted for age
[2] logistic regression models, adjusted for age and all other variables
[a] reference group, **bold** = categories which show significant higher/lower odds ratios compared to the reference group

Source: Richter & Lampert (2008b)

Compared to school factors, peer variables showed an even stronger association with smoking among both girls and boys. Among peer variables the number of close friends of the same sex was the only variable that was not significantly related to smoking. Having a high number of friends of the opposite sex and having a high number of peer contacts after school and in the evening was strongly associated with regular smoking. Students who met their friends after school or in the evening on five or more days a week were almost four times more likely to smoke regularly than boys and girls who met their friends on fewer days. Boys and girls were less likely to smoke regularly if it was difficult or very difficult for them to talk to their best friend about things that really bother them. A similar effect was found for the frequency of peer contacts via phone, text messages or emails.

As described above (see chapter 4.2), significant socio-economic differences in smoking were found only in the case of girls and not boys. Adding the school and peer variables to a model including family affluence and confounders only did not reduce the odds ratios for medium and low family affluence, suggesting that these variables have an independent effect and do not essentially mediate the relationship between family affluence and smoking. It is striking that the associations described were found after adjustment for family affluence. Thus, an effect due to socio-economic status is – at least statistically – ruled out. When the effect sizes of the SES measures are compared with the peer and school variables, the findings imply that influences arising from the peer and school context are more important for adolescent smoking than the wider social structure.

4.4 Consequences of risk behaviour

Risk behaviours are one of the main reasons for adverse health in adolescence. They also have long-term consequences for health and longevity in adulthood. Therefore, they also play an important role in the explanation of social inequalities in health in adulthood as they are strongly linked to mortality and morbidity as well as to one's socio-economic position. However, little attention was given to the short-term effects of risk behaviours for health. The last chapter presents several findings on (health-related) consequences of adolescent risk behaviour in relation to age, gender and socio-economic status.

Consequences of risk behaviour in Germany

A detailed analysis of the German HBSC data found that different forms of bullying are strongly associated with various measures of psychosocial health already in adolescence (Richter at al. 2007). After adjustment for family affluence and other risk behaviours, it was found that students who bully others have a higher odds ratio of low self-rated health, independent of gender (Table 17). Bullying victims displayed a stronger relationship with psychosocial health in general. For all three measures (self-rated health, psychosomatic complaints and mental health) both male and female bullying victims had higher odds ratios than non-involved students. The only exception was self-rated health among girls. For the group of students who are victims of bullying as well as perpetrators there was a significant relationship among girls only in the case of psychosomatic complaints. Boys had 2 or 3 times higher odds ratios for weekly psychosomatic complaints and low mental health, respectively. Interestingly, bullying was also associated with other forms of risk behaviour. Bullying perpetrators in particular had higher odds ratios for regular tobacco use as well as repeated drunkenness, while bullying victims had lower odds ratios for regular alcohol consumption and drunkenness.

Table 17: Associations between different types of bullying, subjective health and risk behaviour, multivariate logistic regression models, boys, odds ratios (OR) and 95% CI, HBSC data: Germany 2001/02 [1]

Boys	Perpetrators (n = 2037)		Victims (n = 1881)		Perpetrators/Victims (n = 1759)	
	OR	95% CI	OR	95% CI	OR	95% CI
Family affluence						
high	1,00 [2]		1,00		1,00	
medium	0,79	(0,62-1,02)	1,34	(0,96-1,87)	0,99	(0,65-1,53)
low	**0,59***	(0,39-0,88)	0,98	(0,61-1,58)	0,71	(0,37-1,38)
Self-rated health						
excellent/good	1,00		1,00		1,00	
fair/poor	**1,52***	(1,05-2,02)	**1,72****	(1,17-2,53)	1,62	(0,97-2,72)
Psychosomatic complaints						
none/one	1,00		1,00		1,00	
2 or more	0,89	(0,60-1,31)	**2,44*****	(1,71-3,49)	**2,02****	(1,25-3,28)
Mental health						
good	1,00		1,00		1,00	
bad	0,91	(0,64-1,29)	**2,11*****	(1,51-2,96)	**3,00*****	(1,96-4,58)
Tobacco use						
never/less than weekly	1,00		1,00		1,00	
at least once a week	**1,61****	(1,16-2,22)	1,39	(0,83-2,32)	0,74	(0,39-1,38)
Alcohol use						
never/less than weekly	1,00		1,00		1,00	
at least once a week	**1,89*****	(1,35-2,63)	**0,51***	(0,27-0,97)	1,40	(0,77-2,53)
drunkenness						
never/once	1,00		1,00		1,00	
2-3 times or more	**1,55***	(1,11-2,17)	**0,51***	(0,29-0,90)	1,55	(0,86-2,80)

[1] adjusted for age and all other variables in the model
[2] reference group, * p< 0,05, ** p< 0,01, *** p< 0,001

Table 18: Associations between different types of bullying, subjective health and risk behaviour, multivariate logistic regression models, girls, odds ratios (OR) and 95% CI, HBSC data: Germany 2001/02 [1]

Girls	Perpetrators (n = 2221)		Victims (n = 2192)		Perpetrators/Victims (n = 2025)	
	OR	95% CI	OR	95% CI	OR	95% CI
Family affluence						
high	1,00		1,00		1,00	
medium	0,96	(0,70-1,33)	1,021	(0,72-1,43)	0,75	(0,39-1,42)
low	0,85	(0,56-1,30)	0,79	(0,50-1,24)	0,74	(0,32-1,71)
Self-rated health						
excellent/good	1,00		1,00		1,00	
fair/poor	**1,90*** **	(1,37-2,65)	1,15	(0,79-1,67)	0,93	(0,43-2,02)
Psychosomatic complaints						
none/one	1,00		1,00		1,00	
2 or more	1,32	(0,95-1,84)	**1,79** **	(1,29-2,49)	**2,46** **	(1,31-4,63)
Mental health						
good	1,00		1,00		1,00	
bad	0,88	(0,64-1,21)	**2,76*** **	(2,02-3,76)	1,15	(0,60-2,21)
Tobacco use						
never/less than weekly	1,00		1,00		1,00	
at least once a week	1,38	(0,94-2,02)	0,66	(0,38-1,15)	0,73	(0,26-2,10)
Alcohol use						
never/less than weekly	1,00		1,00		1,00	
at least once a week	1,40	(0,92-2,11)	1,05	(0,55-2,00)	2,74	(0,99-7,52)
drunkenness						
never/once	1,00		1,00		1,00	
2-3 times or more	**1,63***	(1,09-2,44)	0,57	(0,31-1,05)	0,60	(0,19-1,95)

[1] adjusted for age and all other variables in the model
[2] reference group, * p< 0,05, ** p< 0,01, *** p< 0,001

Another analysis of the association between behavioural, psychosocial and socio-economic factors and overweight/underweight using the 2002 German HBSC data showed that several risk behaviours were significantly associated with weight categories in bivariate analysis (Mikolajczyk & Richter 2008). However, the pattern differed by gender and in regard to underweight/overweight. Weight-control behaviour and being

bullied at least once a week were more frequently associated with overweight in both genders. High levels of sedentary behaviour, having breakfast irregularly and low levels of physical activity were more frequent only in overweight girls. In contrast, dieting behaviour was associated with underweight in both genders. Among boys none of the risk behaviours were associated with being underweight. A low degree of sedentary behaviour and regularly having breakfast were more frequently reported for underweight girls. However, in multivariate analysis most variables that showed significant bivariate relationships had no significant association with any of the weight categories. Thus, a significant positive association with being overweight was found for sedentary behaviour and a negative association for family affluence. Dieting was used to control for the possible modification of food consumption in overweight pupils; this removed the negative association between the consumption of sweets/soft drinks and being overweight. Furthermore, girls who were bullied at school had a much higher odds ratio of being overweight than non-bullied girls, whereas the association was much weaker in boys. Being underweight was negatively associated only with higher grades and higher parental occupation and not with any of the risk behaviours.

Consequences of risk behaviour across countries

The possible consequences of risk behaviour were also analysed in a multilevel study using the international HBSC data from 2002 (Richter et al. 2009b). The study assessed the contribution of several risk behaviours (tobacco smoking, physical activity, sedentary behaviour, consumption of fruits and vegetables and eating habits) to an explanation of socio-economic differences in self-rated health at both individual and country level. In general, the findings support the results of the German HBSC study. It showed that even during adolescence individual risk behaviours were associated with negative health. A significant association with self-rated health was found for all behaviours even after adjustment for family affluence (Table 19 and 20). The multilevel analysis showed that as far as cross-national variations are concerned it would be

expected that this relationship would be apparent in at least 95% of all countries. Only for television viewing in the case of boys and physical activity in the case of girls does the 95% interval include countries where no such statistically significant association would be expected.

Table 19: Associations of self-rated health (poor/fair) with family affluence before and after adjustment of health risk behaviours, 13- and 15- year old boys. Random intercepts, random slopes model, odds ratios. HBSC data: international 2001/02

Boys	Point estimate OR	95% CI	P (OR)	95% population variation	Variance partitioning coefficient (VPC)	P (VPC)
Model 1						
Family affluence						
high	1.00	-		-	-	
medium	1.21	(1.14-1.29)	<0.001	(1.20-1.23)	0.002	0.239
low	1.84	(1.70-1.99)	<0.001	(1.75-1.93)	0.007	0.157
Model 2						
Family affluence						
high	1.00	-		-	-	
medium	1.18	(1.10-1.27)	<0.001	(1.05-1.33)	0.016	0.285
low	1.64	(1.49-1.80)	<0.001	(1.34-2.00)	0.033	0.123
Smoking (at least once a week)	2.23	(1.97-2.52)	<0.001	(1.34-3.70)	0.099	<0.001
Physical activity (less than 5 days/week)	1.87	(1.70-2.05)	<0.001	(1.47-2.38)	0.033	<0.001
Television use (4 hours or more)	1.13	(1.04-1.22)	0.008	(0.92-1.38)	0.026	0.002
Breakfast (every school day)	0.70	(0.65-0.76)	<0.001	(0.58-0.85)	0.023	0.008
Fruits (daily)	0.80	(0.73-0.87)	<0.001	(0.70-0.92)	0.018	0.336
Vegetables (daily)	0.88	(0.81-0.96)	0.005	(0.78-0.99)	0.016	0.101

Source: Richter et al. (2009a)

Table 20: Associations of self-rated health (poor/fair) with family affluence before and after adjustment of health risk behaviours, 13- and 15- year old girls. Random intercepts, random slopes model, odds ratios. HBSC data: international 2001/02

Girls	Point estimate OR	95% CI	P (OR)	95% population variation	Variance partitioning coefficient (VPC)	P (VPC)
Model 1						
Family affluence						
high	1.00	-		-	-	
medium	1.19	(1.13-1.25)	<0.001	(1.13-1.25)	0.005	>0.500
low	1.80	(1.68-1.94)	<0.001	(1.65-1.97)	0.011	0.125
Model 2						
Family affluence						
high	1.00	-		-	-	
medium	1.17	(1.10-1.24)	<0.001	(1.06-1.29)	0.011	>0.500
low	1.62	(1.48-1.77)	<0.001	(1.22-2.15)	0.045	0.016
Smoking (at least once a week)	2.01	(1.82-2.22)	<0.001	(1.38-2.93)	0.058	<0.001
Physical activity (less than 5 days/week)	1.33	(1.21-1.46)	<0.001	(0.96-1.85)	0.046	<0.001
Television use (4 hours or more)	1.21	(1.13-1.29)	<0.001	(1.01-1.44)	0.019	0.010
Breakfast (every school day)	0.71	(0.66-0.76)	<0.001	(0.55-0.91)	0.028	<0.001
Fruits (daily)	0.79	(0.73-0.84)	<0.001	(0.67-0.92)	0.017	0.013
Vegetables (daily)	0.93	(0.88-0.98)	0.010	(0.87-0.99)	0.006	0.277

Source: Richter et al. (2009a)

The largest independent effect on health was found for smoking, physical inactivity and breakfast consumption. Furthermore, the findings suggest that the relationship between self-rated health and family affluence is mediated by the unequal distribution of risk behaviours across affluence groups in all countries. After adjustment for all behaviours for boys, the odds ratios for family affluence show a percentage decrease of 24% for low FAS and 14% for medium FAS. A similar reduction was found for girls (11% for medium FAS and 23% for low FAS). However, the impact of this contribution differs across countries.

5 Discussion and perspectives

The single studies summarised here support and extend the current theoretical and empirical knowledge on risk behaviour in adolescence. The analysis is among the first to systematically examine adolescent risk behaviour from a comparative perspective over time and across countries using the same data. The study further follows a multidimensional model and looks at determinants as well as consequences of risk behaviour. Its methodological strengths lie in the use of a large representative dataset and the availability of various widely used and internationally tested measures. This final chapter will provide a short summary of the study's main findings and elaborate on their implications for future research and practice.

5.1 Summary of the results

First, the results indicate that all risk behaviours showed remarkable patterns in terms of age and gender. Health-compromising behaviours such as tobacco and alcohol use increase with increasing age, while engagement in positive behaviours declines with age. Moreover, boys and girls showed different patterns of risk behaviour. The whole range of risk behaviour constitutes different areas of risk. In general, boys showed more externalising and evasive forms of risk behaviour (such as bullying or drunkenness) while girls showed more internalising forms (e.g. skipping breakfast). These age- and gender-specific findings support existing regional studies with representative data from Germany using based on comparable age groups and measures (e.g. Appel & Hahn, 2001, Hüttner et al. 1997, 1998, Roth 2002, Raithel 2003a/b).

They also support recent findings from the German Health Interview and Examination Survey for Childern and Adolescents (KiGGS) (Lampert & Thamm 2007, Lampert et al. 2007). So far, comparable data on risk behaviour across countries, including Germany, has been rare. The results based on international HBSC data showed that there are large differences in the diffusion of risk behaviours between countries. Compared to other countries, Germany performs rather badly in respect to many risk behaviours. One-third of 15-year old German students smoked weekly – as many as in no other European or North American country. Germany is also among the five countries that showed the highest regular alcohol use and the highest rates of bullying. Furthermore, the international comparison showed there was a relatively low level of physical activity.

Despite the large differences in prevalence across countries, the findings showed that age and gender patterns are largely universal across countries. Age-related trends in risk behaviour were found in almost all HBSC countries and are similar for a variety of different types of behaviour. It appears that these shifts are a universal phenomenon and demonstrate just how common it is for young people to engage in such behaviours. The general gender patterns in risk behaviour were also supported by international HBSC data. In almost all HBSC countries boys show higher prevalences of externalising and/or evasive forms of inappropriate coping behaviour. Interestingly, gender differences in tobacco smoking were generally lower than for other substance use behaviours. In some countries, mostly western European countries, girls also reported higher rates of smoking than boys. On the other hand, girls were more likely to report that they frequently consume healthy food and are less likely to consume unhealthy food (see also Currie et al. 2008a). However, in all countries they were more likely to skip breakfast and were physically less active. These findings illustrate that there are different issues of concern for girls and boys. The trend data from Northrhine-Westphalia suggested that these age and gender patterns also show a strong persistence over time (see also Leppin & Richter 2008, Settertobulte & Richter 2007). The findings are similar to the results of other German studies. For example, the German Drug Affinity Study also found that the rates of tobacco, alcohol and cannabis use among 11-

to 15-year olds increased during the 1990s and decreased again after 2002 (BZgA 2004, 2005a/b, 2007a).

Second, the results showed that the relationship between adolescent risk behaviour and socio-economic status is very complex. Overall, socio-economic status was not universally associated with risk behaviour. The findings revealed an interesting pattern and showed that some behaviours were more strongly associated with parental SES than others. Thus, no clear socio-economic patterns were observed for smoking, alcohol use and bullying. In contrast, more pronounced and a larger number of socio-economic differences were found for behaviours, established in childhood (e.g. consumption of vegetables and television viewing). These results are consistent for various SES indicators. This general pattern points to conflicting spheres of influence and supports the idea of an equalisation process of socio-economic differences in some behavioural outcomes. Overall, the empirical evidence supports the existence of 'organised' patterns of adolescent risk behaviour. From the results it might be concluded that next to the classification in internalising, externalising and evasive forms of risk behaviour a further classification might be considered in terms of SES differences: risk behaviours that begin to develop in adolescence (e.g. tobacco smoking and alcohol use) and are less strongly influenced by parental socio-economic status versus behaviours that are already established in childhood and even in adolescence are mainly influenced by parents (e.g. nutrition and physical activity/sedentary behaviour).

In addition, our results showed that substance use measures – even though they were not related to parental SES – were strongly linked to the students' own socio-economic status (i.e. type of school). This finding supports other international studies showing that adolescent substance use is more strongly associated with adolescent's own status than with familial background (Vereecken et al. 2004, Hagquist 2007, Koivusilta et al. 2006). The results also suggest that family social class background influences the educational chances of young people (Lampert & Richter 2006) but not directly their substance use behaviour.

The fact that rather inconsistent socio-economic differences were found in some risk behaviours and strong differences in others was supported by the analyses based on trend and international HBSC data. Overall, remarkably, the patterns of SES associations pointed in the same direction across geographic areas, i.e. both measures of parental socio-economic status showed either a consistent association with particular behaviours or not. This may indicate, at least, that the basic directions of the SES-behaviour relationship are the same across countries. In addition, trend analyses showed that the weak association between parental SES and the strong impact of type of school on regular smoking among 11- to 15-year olds in Germany was consistent from 1994 to 2002. The level of socio-economic differences in smoking remained virtually unchanged for girls and boys in Germany over the past 10 years.

Third, the findings given above were supported by an analysis on the importance of different social contexts for adolescent risk behaviour. Smoking was taken as an example and related to various determinants from the peer and school context. The results showed that several social and psychosocial factors from these contexts were closely associated with adolescent smoking. In multivariate models the peer and school factors were more strongly related to tobacco use than family affluence. These findings imply that influences arising from the peer and school context are of greater importance than the wider social structure for behaviours established in adolescence. They also underline the idea that psychosocial influences outside the family environment could result in an homogenising effect on health inequalities in risk behaviour.

Fourth, we observed that risk behaviours are associated with adverse health as early as adolescence. This was true for various measures of risk behaviour and health. For example, victims of bullying and students who are bully victims as well as perpetrators showed strong associations with all measures of adverse subjective health. In comparison, male perpetrators in particular showed higher prevalences of substance use behaviours, while victims had significantly lower rates. Several risk behaviours were also associated with overweight and/or underweight, showing different patterns for gender and BMI categories. However, in multivariate analysis only sedentary behaviour and being bullied were

associated with being overweight, which indicates that some of these relationships are mediated through or 'explained by' the other variables.

Results based on the international HBSC study showed that all the risk behaviours included were independently associated with self-rated health and that this was found for almost all countries. Even though the number of effects varied slightly between countries and behaviours, the general consistency across the different behaviours is remarkable. Only television viewing in boys and physical activity in girls showed smaller associations with self-rated health across countries. Furthermore, the findings suggest that the relationship between self-rated health and family affluence is mediated by an unequal distribution of health risk behaviours across socio-economic groups in all countries.

5.2 Implications and perspectives for research and practice

In general, the findings reported in this study can only be understood as yet another piece in the jigsaw puzzle on the description and explanation of risk behaviour in adolescence. However, the findings can be viewed as important when it comes to the aforementioned shortcomings of research on adolescent risk behaviour in Germany. Although this study provides an important perspective on risk behaviour and extends existing knowledge of the topic, it is important to recognise its limitations. The general limitations apply to the design of the study, e.g. its cross-sectional and school-based approach as well as the measurement of some of the variables. In the following paragraphs a number of important consequences arising from the general limitations will be discussed together with some important gaps in the knowledge of adolescent risk behaviour that the present study identified.

Implications for research

The findings together with the methodological limitations point to several important implications for future research. The work reported here reaffirms the complexity of adolescent risk behaviour and underlines the use of a comparative perspective across time and across countries, as

this approach helps to support and improve current knowledge. For example, it provides opportunities to highlight findings from regional studies, identify trends and assess what determinants and consequences of risk behaviour are general or local. It also shows that taking (social) determinants as well as (short-term) consequences of risk behaviour into account contributes to a better understanding of adolescent risk behaviour. However, we also identified several pieces of missing information that could not be addressed using the HBSC data or were derived from the results. The following paragraphs remark on key approaches for future research.

The empirical studies in this summary are all based on cross-sectional data. Thus, causal interpretations were not possible. For example, it was not possible to conclude that psychosocial determinants *influence* risk behaviour or that adverse health is a direct *consequence* of risk behaviour. Thus, longitudinal or cohort studies, which ideally begin in childhood and run for five or 10 years up to early adulthood, are of major relevance for future research. These could provide more insight into the mechanisms of risk behaviour, including proximate and distal determinants as well as the short- and long-term consequences of risk behaviour. For Germany especially there is a huge need for these kinds of studies. It is promising, however, that several longitudinal studies are currently being planned and implemented that could address these research questions (Kurth 2007). Especially in adolescence, when several aspects of risk behaviour are not yet established (and are thus preventable), those analyses are of crucial importance.

These analyses could help to address many questions that are raised throughout the study. For example, it would be possible to analyse how risk behaviour changes over the life course, which factors and mechanisms determine these changes and how (fast) risk behaviours affect adolescent health. A longitudinal study would also provide an opportunity to examine the increasing emergence of socio-economic differences in risk behaviour (especially for substance use behaviours) in the transition from adolescence to adulthood as well as their determinants. Longitudinal studies are also required to analyse the effects of socio-economic status on risk behaviour within the context of peer and school factors or parental factors such as family climate or social support. These analyses

could provide information on possible pathways for the development of socio-economic health differences and would thus facilitate the design of effective interventions to tackle the development of current and future socio-economic differences in health at an early stage. Furthermore, it would be possible to assess whether certain psychosocial stressors reflect a causal effect on health or vice versa. An examination of these questions can critically contribute to the identification of health-promoting strategies that focus on life style and thus help to prevent future social inequalities in risk behaviour and health by addressing not only individual but also social conditions.

Next to longitudinal approaches, the findings also indicate that the inclusion of determinants at different levels of analyses is an important topic for future research. The HBSC survey is a rather broad study on health and health behaviour. Thus, only a limited number of self-reported items could be included in the survey. In other words, the survey provides a general but rather crude picture of the background of risk behaviour in adolescence. Future studies should include further and more detailed items, especially for the proximate determinants of risk behaviour. These factors are likely to mediate the relationship between risk behaviour and age, gender, SES and health-related consequences. Next to adding more detailed and further determinants to the research model, it is also important to take different levels of interest into account. Multilevel analyses became increasingly important with the further development of statistical software, thus allowing a great step forward in empirical social sciences. They make it possible to take different analytical levels into consideration (such as country or school level). A closer look at macro-level characteristics (such as countries' school systems, welfare systems and overall material wealth) could therefore shed additional light on differences in the diffusion of risk behaviour across countries and on the role of multilevel/contextual factors in the explanation of adolescent risk behaviour. In addition, taking into account the level of classes and the level of schools would further contribute to a better understanding of risk behaviour as these contextual levels include several determinants that are crucial for adolescent risk behaviour (Bilz & Melzer 2008).

Overall, the general aim of future research should be to concretise the analyses of risk behaviour in a direction that helps to explain the development and consequences of risk behaviour. Our proposed conceptual framework could be a useful tool in directing subsequent explanatory and intervention research in this field. The suggested research strategies could help to improve the planning process for theory-driven intervention strategies, thereby reducing health-damaging behaviours and future inequalities in risk behaviour.

Health promotion implications

As already indicated, children and adolescents are important target groups for prevention and health promotion. Although most adolescents negotiate this period of transition without major disruption or sustained high-risk behaviours (Moffitt 1993), young people who experience such disruption and persistently engage in risk behaviours are in trouble and have a significantly greater chance of being in trouble later in life (Arnett 1999). So successful interventions for these young people are likely to have important pay-offs when it comes to preventing future health problems. The international HBSC data showed that Germany performs rather badly in the case of many indicators. However, results from the 2005/06 HBSC study, which could not fully be taken into account in this summary, give reason to hope (Richter & Leppin 2008, Nickel et al. 2008, Richter 2008). Together with other, non HBSC data (BZgA 2005a/b, 2007b), the trend analyses from 2002 to 2006 showed a decrease in several types of risk behaviour and suggest that a number of policy interventions and public discussion processes that took place between the last two surveys have been crowned with success. The preliminary reduction of substance use has to be evaluated as a positive development. However, it is unknown whether the positive trend will stabilise in future studies. In addition, the results also indicate that socio-economic differences in risk behaviour could not be reduced and remained stable despite all these strategies and interventions.

Even though our study indicates the need for further research efforts, the present findings must be considered as important from a health policy perspective. As a comprehensive description of potential health-related interventions and strategies is not possible here, some final remarks on the role of preventive and health promotion strategies will be presented. Special attention will be paid in this connection to strategies that focus on age, gender and socio-economic status.

Although schools and health agencies have targeted individual risk behaviours with interventions, the positive results have been short-term at best (Kulbock & Cox 2002). The developmental perspective proposed here shows that health promotion should follow a contextual perspective and should involve attempts to support, alter, or redirect developmental processes that are already in motion (Hurrelmann & Richter 2006). The goal is not only to alter current attitudes and behaviours but also to have an enduring impact on developmental trajectories. This includes not only support in building self-knowledge and self-confidence but also support in the development of skills to cope with stress and solve problems. But the question of which 'functional equivalents' of risk behaviour can be offered to adolescents and how to do so is still unanswered. Furthermore, recent approaches have largely focused on individual behaviour. Focusing exclusively on behavioural dimensions tends to put all of the adaptional burden on individuals and ignores or downplays ecological and social living conditions as prerequisites for healthy development (Rutter 1995, Lampert et al. 2006, Richter & Mielck 2006) Experience has shown that health promotion can be successful only if it is embedded in a structural context that takes into account the dependency of individual development of environmental conditions and that aims at improving the living conditions of adolescents and their families (Weyers et al. 2007).

The reported results show that strategies aimed at risk behaviour should start early in life, since up to 30% of 15-year olds already smoke on a regular basis, drink alcohol and show crucial deficits in term of nutrition and physical activity. In regard to adolescent substance use in particular it is necessary to take action at the level of primary prevention earlier than before (Kolip 2000, Hurrelmann & Richter 2006). This would contribute to shift and to postpone regular risk behaviour – as it is

largely unavoidable – till a later date. On the other hand, it can be rewarding to provide secondary preventive action such as smoking cessation programmes to older students who are already smoking (Jerusalem et al. 2003, Pinquart & Silbereisen 2002).

Gender aspects have so far played only a small role in the development of preventive actions. There is a crucial need to develop and strengthen gender-orientated strategies for effective preventive actions – for both genders (Lampert et al. 2006, Richter & Mielck 2006). In this connection it is important to initially evaluate whether gender-specific stress and tasks lead to specific risk behaviours. It can subsequently be decided whether the intervening action can take gender-specific interests and responses into account and whether the different resources of both genders can be used successfully. When this is taken into consideration, it appears that for some risk behaviours a joint intervention for both boys and girls may be the most effective strategy. For other problems, though, it may be quite useful to establish separate groups for boys and girls.

In terms of socio-economic differences our results are important because they show that inequalities in some risk behaviours are not fully developed in adolescence and are therefore subject to change. Compared to other European countries Germany has a large backlog when it comes to developing and testing specific actions that tackle social inequalities in health and risk behaviour (Mielck 2006, Lehmann & Weyers 2007, Lampert et al. 2006, Richter & Mielck 2006). The attenuation of social inequalities in the case of some risk behaviours poses a challenge for prevention and health promotion. If, for example, all adolescents are exposed to similar health-related risks (e.g. tobacco smoking or cannabis use), it is unlikely that preventive strategies that focus only on deprived target groups will lead to a reduction in risks across the whole population. Next to the 'preventive dilemma', which often is used as a label for the failure to meet the preventive demands of pupils who need it most (Lampert et al. 2006, Richter & Mielck 2006), it looks as if a further specific *strategic dilemma* is emerging in adolescence. The findings suggest that some behaviours require wider strategies targeted at all adolescents – independent of their socio-economic status – (even though age- and gender-specific segmentation is required here), while an ap-

proach targeted at low SES youth seems more appropriate for other behaviours.

Social contexts outside the family environment represent one promising starting point. Thus, health policy and health-engineering strategies (such as increases in taxation and smoke-free environments) are likely to have positive effects on the whole population (Geyer 2003, Weyers et al. 2007). These actions promise a high degree of effectiveness as they reach lower and upper status groups in equal measure. And what is more, they do not require, or barely require, additional efforts to improve the protection of health. Furthermore, starting points are to be found in the psychosocial school environment and peer group, both of which are likely to be influenced less by socio-economic background (Bilz & Melzer 2008, Lampert & Richter 2006). However, it needs to be remembered that socio-economic differences in risk behaviour widen with increasing age. In addition to a continuous needs assessment, a greater number of target-orientated actions will be inevitable. For effective prevention it is apparently necessary to consider different strategies. On one hand, actions that are targeted at the whole population and also have a positive health-promoting effect among disadvantaged adolescents. On the other hand, there is a need for actions that are targeted especially at children and adolescents from low socio-economic backgrounds. In this connection it will be necessary to clearly define health-related challenges as well as their determinants in the various periods of childhood and youth. Only then can this mixed-strategy be effective and successful. Thus, it could be useful to combine these strategies and have a *general component* and a *specific component* that differs according to the specific risk behaviour. The classification of adolescent risk behaviour in externalizing, internalizing and evasive behaviours as well as in newly occurring and already established behaviours allows better identification of what these specific areas of risk are and what groups must be addressed.

As previously stressed, the results of the present study should not be seen as a final answer to the question of what determines risk behaviour and what consequences for one's health and future life arise from such behaviour. We still know little about the form and content of preventive strategies in general and specific health-related problems in

particular, not to mention the right timing or combination of related actions. We can only hope that the presented results provide a new impulse for an intensified discussion of the mechanisms and determinants of adolescent risk behaviour. Improving the health chances of children and adolescents from lower socio-economic groups can only be achieved with a combined strategy derived from the different areas reported on above. It is therefore necessary to create and implement accurate preventive actions for clearly defined health problems. Despite the complexity of the aetiology of risk behaviour and the need for further research, this should never be an excuse for not using the knowledge already available. Politicians and policy makers are requested to use and apply the existing evidence, as the promotion and support of adolescents and families always represent an investment in the future of society.

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