

University of Bielefeld
Faculty of Health Sciences – School of Public Health
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**SUBJECTIVE HEALTH AND WELL-BEING OF
CHILDREN & ADOLESCENTS:
Cross-national comparisons and German trends**

Dissertation Thesis

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submitted by
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Publications that form the basis of this Thesis

1. Ravens-Sieberer, U., Torsheim, T., Hetland, J., Vollebergh, W., Cavallo, F., Jericek, H., Alikasifoglu, M., Välimaa, R., **Ottova, V.**, Erhart, M., & the HBSC Positive Health Focus Group (2009). Subjective health, symptom load and quality of life of children and adolescents in Europe. *International Journal of Public Health* 54 (Suppl 2), S151-S159. **Impact Factor: 2.539 (2011)**
2. Erhart, M., **Ottova, V.**, Gaspar, T., Jericek, H., Schnohr, C., Alikasifoglu, M., Morgan, A., Ravens-Sieberer, U., & the HBSC Positive Health Focus Group (2009). Measuring mental health and well-being of school-children in 15 European countries using the KIDSCREEN-10 Index. *International Journal of Public Health* 54 (Suppl 2), S160-S166. **Impact Factor: 2.539 (2011)**
3. **Ottova, V.**, Erhart, M., Vollebergh, W., Kokonyei, G., Morgan, A., Gobina, I., Jericek, H., Cavallo, F., Valimaa, R., Gaspar de Matos, M., Gaspar, T., Ravens-Sieberer, U., & the Positive Health Focus Group (2012b). The Role of Individual and Macro-level Social Determinants on Young Adolescents' Psychosomatic Complaints. *The Journal of Early Adolescence*, 32(1): 123-158. **Impact Factor: 2.303 (2011)**
4. **Ottova, V.**, Hillebrandt, D., Ravens-Sieberer, U., & das HBSC-Team Deutschland (2012d). Trends in der subjektiven Gesundheit und des gesundheitlichen Wohlbefindens von Kindern und Jugendlichen in Deutschland: Ergebnisse der Health Behaviour in School-aged Children Studie (HBSC) 2002 bis 2010. *Das Gesundheitswesen*, 74 (Suppl 1), S15-S24. [In German]. **Impact Factor: 0,937 (2011)**
5. Ravens-Sieberer, U., **Ottova, V.**, Hillebrandt, D., Klasen, F., & das HBSC-Team Deutschland (2012). Gesundheitsbezogene Lebensqualität und psychische Gesundheit von Kindern und Jugendlichen in Deutschland: Ergebnisse aus der deutschen HBSC-Studie 2006–2010. *Das Gesundheitswesen*, 74 (Suppl 1), S33-S41. [In German]. **Impact Factor: 0,937 (2011)**
6. **Ottova, V.**, Erhart, M., Rajmil, L., Dettenborn-Betz, L., & Ravens-Sieberer, U. (2012a). Overweight and its impact on the health-related quality of life in children and adolescents: Results from the European KIDSCREEN survey. *Quality of Life Research* 21(1): 59-69. **Impact Factor: 2,3 (2011)**

Other publications directly related to the topic of this Thesis

7. Lenzi, M., Vieno, A., de Vogli, R., Santinello, M., **Ottova, V.**, Baska, T., Griebler, R., Gobina, I., Gaspar de Matos, M. (2012). Perceived teacher unfairness and headache in adolescence: A cross-national comparison. *International Journal of Public Health*. doi: 10.1007/s00038-012-0345-1. **Impact Factor: 2.539 (2011)**
8. Rathmann, K., **Ottova, V.**, Hurrelmann, K., de Looze, M., Levin, K., Molcho, M., Elgar, F., NicGabhainn, S., van Dijk, J.P., & Richter, M. (submitted). Macro-level determinants of young people's subjective health and health inequalities: A multilevel analysis in 27 welfare states. *Journal of Epidemiology and Community Health*.

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List of abbreviations, figures, and tables

List of abbreviations

ANOVA – Analysis of variance
ANCOVA – Analysis of covariance
BMI – Body Mass Index
FAS – Family Affluence Scale / Family Affluence Status
GDP – Gross Domestic Product
Gini – Gini-index of income inequality
GNP – Gross National Product
HBSC – Health Behaviour in School-aged Children study
HBSC-SCL – HBSC Symptom Checklist
HDI – Human Development Index
HRQoL – Health-related quality of life
OR – Odds Ratio
SDQ – Strengths and Difficulties Questionnaire
SES – Socioeconomic status
SRH – Self-rated health
WHO – World Health Organization

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Introduction

Better hygiene and medical breakthroughs in the last century contributed towards significant improvements in childhood health (Hobbs et al., 1985; Newacheck & Taylor, 1992; Palfrey et al., 2005). This positive development is overshadowed by increasing morbidity and mortality due to non-communicable disease (Hobbs et al., 1985; Hurrelmann, 2006; Perrin et al., 1993). Rates of chronic conditions in children have increased (Perrin et al., 2007), and among the major source of burden are mental health problems (WHO, 2001). Palfrey and colleagues call the shifting morbidity patterns, coupled with socioeconomic as well as technological influences on health, health disparities, overweight and obesity, and increasing mental health problems, as “millennial morbidity” (Palfrey et al., 2005).

Upon the background of these changes from “life-threatening” to “life-accompanying” diseases, it is important to investigate the health situation of children and adolescents from their own subjective perspective as it extends the knowledge available from objective data. Subjective data is especially important upon consideration of increasing life expectancy and longer duration of disease. In order to be able to draw valid conclusions about the status of children’s health, it is crucial that assessment of their health is as comprehensive as possible, and includes children and adolescents from different cultures and backgrounds. Furthermore, it is of further benefit to combine data at individual and aggregate level to explore the effects of national characteristics on their individual health. Six papers have been published which explore children’s subjective health from various perspectives. These six papers form the empirical basis of this Thesis. The empirical evidence draws on data that comes from the international Health Behaviour in School-aged Children (HBSC) study (Currie et al., 2009) and the European KIDSCREEN study (Ravens-Sieberer et al., 2006).

The first chapter of the Thesis begins with a description of the theoretical concepts of subjective health and well-being. It addresses problems associated with their definition and their application in research. Next, practical issues regarding the assessment of subjective health in children and adolescents in general, as well as typical measurement tools are discussed. Following this, the chapter presents the main determinants of health. The overview differentiates between individual level factors, such as family, peers, school, and sociodemographic factors, and determinants at the macro level, such as gross domestic product (GDP). The chapter concludes with a review of studies on child health incorporating a macro level perspective. The second chapter connects the theoretical and empirical parts of

the Thesis and presents the main aims of the Thesis, followed by objectives and research questions for each of the six papers. The data sources used for the empirical section are described in chapter three.

Chapter four presents the empirical evidence and results of the six papers. Consequently, it is subdivided into six sections, each beginning with a summary of the background, methodological approach, results and conclusions, and is followed by the paper as it was published. The order of the papers is content-based: the first four papers address subjective health and well-being from a cross-national and German perspective, while the last two papers focus on two specific areas of health – mental health and overweight – and analyze their impact on global well-being.

The first paper (Ravens-Sieberer et al., 2009) begins by describing the health situation of children and adolescents cross-nationally and examining important differences in health patterns across countries and the prevalence of different subjective health types.

The second paper (Erhart et al., 2009) examines in how far cross-cultural measurement of children's health status is possible by analyzing the psychometric properties of the KIDSCREEN-10 and its function as a mental health index. Previously observed group differences (age, gender, socioeconomic status, country) are evaluated with regards to their compliance with theoretical considerations in a European-based sample comprising 15 countries.

Building upon previous empirical findings, the third paper (Ottova et al., 2012b) investigates the relationship between individual level determinants, and factors at macro level to answer the following questions: a) which social context variables (family, peers, school) are most relevant for children's subjective health in cross-national comparison; and b) what is the contribution of national level factors, such as the prosperity of a nation (measured via the Human Development Index), in explaining country differences in subjective health of children and adolescents.

The fourth paper concludes the first section of the empirical evidence. Against the background of the importance of monitoring health patterns for a variety of stakeholders (policy makers, practitioners), it analyzes trends and age and gender patterns in subjective health in a sample of children and adolescents in Germany.

The last two papers focus on two emerging issues in child health: mental health problems and overweight. Previous research has shown that the presence of mental health problems and overweight are relevant risk factors for overall health and well-being (e.g., Ravens-Sieberer et al., 2008d; Schwimmer et al., 2003; Williams et al., 2005).

The fifth paper analyzes the effects of relevant social factors on health-related quality of life and mental well-being based on HBSC data from 2006 and 2010 in Germany (Ravens-Sieberer et al., 2012).

The sixth paper (Ottova et al., 2012a) uses data from the European KIDSCREEN study to focus on overweight and its impact on health-related quality of life cross-nationally. This paper concludes the second empirical part of this Thesis.

Chapter five summarizes the key findings from the six papers and formulates four central messages, which emerge out of these empirical results. These messages are then discussed upon the background of the theoretical foundations and current research. Finally, the methodological limitations of this Thesis are discussed and implications are made for research, policy, and practice.

In the following chapters, the expression “children” and “children and adolescents” will be used interchangeably. The term “child” or “children” will be used to refer to all people under the age of 18 years, and thus includes adolescents as well.

1 Theoretical background

Children’s subjective health and well-being is a broad field and therefore it is important to specify the underlying concepts and how these will be used in the Thesis. Consequently, this chapter begins by presenting the different constructs of subjective health and well-being and their origins in theory. The following segment addresses the practical issues of subjective health assessment whereby a focus is placed on constructs used in the HBSC study and their conceptualization in this study. The last section will touch upon the main determinants of health and their relevance for this Thesis.

1.1 Theoretical constructs of subjective health and well-being

The concepts of subjective health, well-being, life satisfaction, and health-related quality of life are all subjective health constructs. Although very similar, and frequently used interchangeably in literature (Radoschewski, 2000; Schumacher et al., 2003), they are in fact distinct concepts. The following section will therefore highlight the main distinguishing characteristics of these concepts.

Subjective health, or *self-rated health*, is an important component in the WHO definition of health (WHO, 1948). Self-rated health asks the individual to reflect and evaluate his or her health globally (Ravens-Sieberer et al., 2010b). This self-evaluation of health can take place within two reference frames: either within the individual context (i.e. the person reflects his or

her physical and psychological well-being, functioning or individual health expectations); or within the social context. In the latter, the individual compares his or her health with that of others of the same age and gender or with the same health conditions (Lippke & Renneberg, 2006). This frame of reference is important as research has shown that self-evaluations of health vary according to individual circumstances, age, gender, social class, and ethnicity (Blaxter, 1990). Depending on the time frame used, one can further distinguish between health status (a long-term property) and health state (a short term property) (Blaxter, 1989, 1990). Self-rated health is a typical measure of health status, whereas health complaints, injuries and accidents reflect a health state (West & Sweeting, 2004). In this Thesis, both time frames are considered.

This concept of subjective health or self-rated health is distinct from the multi-dimensional concept of *subjective well-being*. The latter was shaped by researchers in sociology, quality of life or mental health research, as well as personality, social or cognitive psychologists (Diener et al., 2003). Particularly the works of Carol Ryff can be considered very influential in well-being research (Westerhof & Keyes, 2010). Subjective well-being consists of affective and cognitive components, some of which are stable and others of which are subject to change over time (Diener, 1994). Important distinctions are made between eudaimonic and hedonic well-being (Ryff et al., 2004). *Eudaimonic* refers back to Aristotle who used the term “eudaimonia” to mean “the highest of all good” which was later referred to as the realization of one’s true potential or simply as happiness (Ryff, 1989, p. 1070). Another form of well-being is *hedonic*, and this has its roots in “ideas of pleasure, happiness and the satisfaction of human appetites” (Ryff et al., 2004, p. 1384). Keyes refers to hedonic well-being as emotional well-being (Keyes, 2006). In contrast, eudaimonic well-being reflects positive functioning and is an evaluation of one’s psychological functioning (Ryff, 1989).

Another important distinction is made between evaluative measures of well-being that reflect cognitive aspects of the respondent and measures of affect, which capture the respondent’s emotional state at a particular point in time (OECD, 2011). The concept of life satisfaction, which draws upon psychological and sociological research (Ravens-Sieberer et al., 2010b), refers to evaluative aspects of well-being in the sense that an individual judges his or her position in life (Diener, 1994). It is one of three main components of well-being (life satisfaction, positive affect, and negative affect) (Diener, 1984), and reflects an overall evaluation of well-being (OECD, 2011). Other frequently used synonyms for well-being are *happiness* and *life satisfaction* (Bjornskov, 2008; Currie et al., 2008; Diener et al., 2003), and

even though in theory life satisfaction forms a component of well-being, the term is often used as a synonym for well-being. Well-being and life satisfaction are both associated with a number of other positive outcomes, such as mental health (Park, 2004), a positive attitude towards life or self-esteem (Joronen & Astedt-Kurki, 2005), and certain health behaviors, such as physical activity (Thome & Espelage, 2004). School experiences are also closely associated with life satisfaction (Ravens-Sieberer et al., 2004).

Another concept closely associated with well-being is health-related quality of life (HRQoL) (Diener et al., 2003). HRQoL has its roots in traditional general health status measures (Leplege & Hunt, 1997), and is thus strongly related to the health concept (Ravens-Sieberer et al., 2006). Still, to this day, there is no consensus on its definition and no proper conceptualization could be reached (Bowling, 1997; Leplege & Hunt, 1997; Taillefer et al., 2003). Partly responsible for this is the increasing practice of using HRQoL as a catch-all term for all non-clinical data – but HRQoL does not just reflect individual performance and functioning (Bowling, 1997; Pollard & Davidson, 2001). According to a widely accepted definition, it is a multi-dimensional and latent construct (Ravens-Sieberer, 2000; Ravens-Sieberer et al., 2006; Ware Jr, 2003) consisting of physical, emotional and social functioning (Leplege & Hunt, 1997). Over the past years, there has been an increased interest in HRQoL measures, in particular in the medical field, but also in health economics (e.g., health utility, cost benefit analyses) (Bullinger, 2002). Early HRQoL research has focused on clinical populations in order to assess the subjective impairment associated with specific diseases. However, today a variety of generic instruments exist, permitting HRQoL assessment in general populations as well. In children and adolescents, a well-known generic instrument for HRQoL assessment is KIDSCREEN (Ravens-Sieberer et al., 2006).

1.2 Assessment of subjective health and well-being in children and adolescents

Indicators are a vital tool for benchmarking in public health and in the monitoring of trends across time. Not only in research, but also in practice and policy, indicators have become indispensable tools for evaluation. However, the assessment of subjective health and well-being in children and adolescents is connected to many challenges. Consequently, the following section introduces shortly how indices on child well-being developed over time, which practical issues and challenges were involved and, finally, presents the theoretical framework for the measurement tools that were used in this Thesis.

Efforts in the development of indices on child well-being have been underway for some time. Their origins lie in the Social Indicators Movement of the 1960s, but it was not until the 1970s

that efforts were made to synthesize data on child well-being for comprehensive reports at various levels. In the 1990s there was an increased interest in social indicators, but soon it became clear that present tools for assessment were inadequate for large-scale assessment. Since then indicators have become more child-focused and there have been efforts towards development of indicators of positive well-being (Lippman, 2007).

There are basically two approaches that can be used to obtain information on subjective health in children and adolescents: via self-report or by proxy-report (typically parent-report) (Erhart et al., 2006). The choice for either approach depends on a number of factors, above all on the availability and reliability of the information obtained (Ravens-Sieberer et al., 2006). Proxy-reports can serve as useful additional information, but care should be taken that children's reflection of their environment and their evaluation of life may be different from that of adults (Bradshaw et al., 2007). Thus, there is a general preference for the child perspective in assessment of well-being (Lippman et al., 2009). Regardless of which method is chosen, assessment needs to be age-, gender-, and culturally-sensitive, and take the individual's socioeconomic background into account. Further, the instruments need to have undergone extensive piloting and if possible, should have been used previously in surveys (Erhart et al., 2006).

The international Health Behaviour in School-aged Children (HBSC) Study provides a unique opportunity to assess the subjective health and well-being among children and adolescents using multiple indicators. Two single items measures, self-rated health and life satisfaction, are used to assess global subjective health and well-being. Epidemiological research has shown that self-rated health is a fairly stable measure over time and has strong predictable power for mortality and morbidity (Idler & Benyamini, 1997). Life satisfaction is assessed via the Cantril Ladder (Cantril, 1965), a single item measure, which also shows moderate stability (Huebner, 2004). Figure 1 shows how these two positive concepts are complemented by further measurements in the HBSC Positive Health Framework (Ravens-Sieberer et al., 2005). The concepts and the instruments, as well as their relationship to one another, will be described in the following.

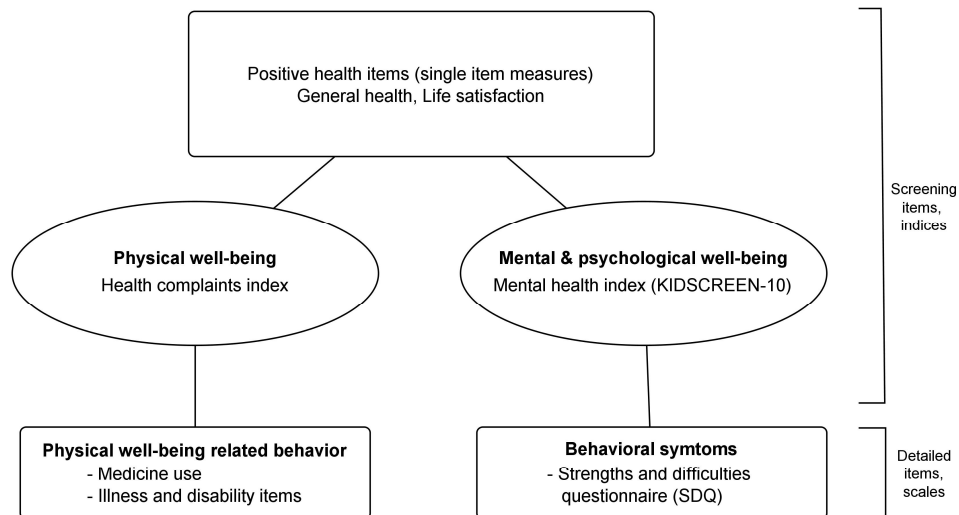


Figure 1: Positive Health Variables; adapted from: Ravens-Sieberer et al. (2005), p. 147

The short assessment of general health and life satisfaction is accompanied by more detailed measurements of physical well-being on the one hand, as well as mental and psychological well-being on the other. Physical well-being is operationalized by means of health complaints – even though they are a better reflection of ill well-being rather than positive health. The eight-item HBSC Symptom Checklist (HBSC-SCL) covers somatic symptoms (e.g., headache, stomach ache), as well as psychological symptoms (e.g., nervousness, irritability) (Haugland et al., 2001; Hetland et al., 2002) and, consequently, can be analyzed using a two-factor approach (Haugland et al., 2001), or by means of a unidimensional approach (Ravens-Sieberer et al., 2008b). Within the HBSC concept, health complaints are mainly a measure of physical well-being, but they are also employed as an indicator of mental health (Erhart et al., 2009; Hagquist, 2010). This seems plausible because studies show that health complaints are stress-related (Sundblad et al., 2008).

Mental health well-being is operationalized in the HBSC study by means of the KIDSCREEN-Mental health index – a robust and cross-culturally valid measure (Erhart et al., 2009). The fact that KIDSCREEN highly correlates with other mental health scales (Ravens-Sieberer et al., 2006) justifies its use as an indicator of mental well-being. Beyond, the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997), a screening questionnaire for behavioral problems is used to assess mental health problems (Ravens-Sieberer et al., 2005). The combination of these instruments provides a good assessment of the mental health status in children and adolescents (Ravens-Sieberer et al., 2008c).

1.3 Determinants of children’s subjective health and well-being

Knowledge about the effects of poor social and economic circumstances on health, and the role of material and psychosocial factors on health and their contribution towards explaining differences in health between various population groups (Wilkinson & Marmot, 2003), goes back to the publication of two reports: *The Black Report* and *The Health Divide* (Townsend et al., 1992). The interest for the study of social determinants of health was sparked by the desire to learn more about the factors accounting for the health differences in different socioeconomic groups, and in finding explanations for national differences in population health (Raphael, 2006). Wilkinson and Marmot identified variables, such as stress, social exclusion, work type, unemployment, or social support as relevant social or psychosocial determinants of health (Wilkinson & Marmot, 2003). To understand the pathways and underlying psychosocial processes by which these determinants affect health, it is important to take the different levels of influence (i.e., the micro-, meso-, and macro level) into account (Martikainen et al., 2002).

1.3.1 Psychosocial pathways of health

Socioeconomic status (SES) influences health already early in childhood and can have long lasting effects on health in adulthood (Matthews et al., 2010). Psychosocial factors are an important link between low SES and health (Eckersley, 2007). Poor quality family environment is an important psychosocial risk factor, and has emerged as being associated with health risk behaviors, as well as with low SES in adulthood. Exposure to psychosocial stress has been linked to (poor) health and there has been a debate in the research community whether stress may be a mediating link between SES and health (Adler & Snibbe, 2003; Chen, 2004; Matthews et al., 2010). According to Martikainen and colleagues micro and macro level factors influence health through social processes which at the different levels lead to “perceptions and psychological processes at the individual level [...] [and which then] can influence health through direct psychobiological processes or through modified behaviours and lifestyles” (Martikainen et al., 2002, p. 1092).

Research has shown that socioeconomic differences in health can be caused in different contexts and on different levels (Chen, 2004). Based on a previous model of Dahlgren and Whitehead, Figure 2 shows a modified and extended version of the model depicting the main determinants of health¹. At the center are the individual traits, including age, sex, race, and

¹ The model in Figure 2 shows a modified version of the original model published in Dahlgren, G., & Whitehead, M. (1991). Policies and strategies to promote social equity in health. Stockholm: Institute for Future Studies. The model depicted in Figure 2 was published in: Committee on Assuring the Health of the Public in the 21st Century (2002).

other biological factors; followed by individual behavior, social, family and community networks, living and working conditions, and at the very outer level, broad social, economic, cultural, health and environmental factors. Policies at the global, national, state and local level are found at the very outer level. Although the model does not give any insight into the pathways and interactions between the different factors, it makes clear that determinants can be grouped in different ways and can exert their influence from different levels. Furthermore, the role of time is not visible here; especially the transitions between different developmental stages are important critical points, and might change the importance of several health determinants (Wilkinson & Marmot, 2003).

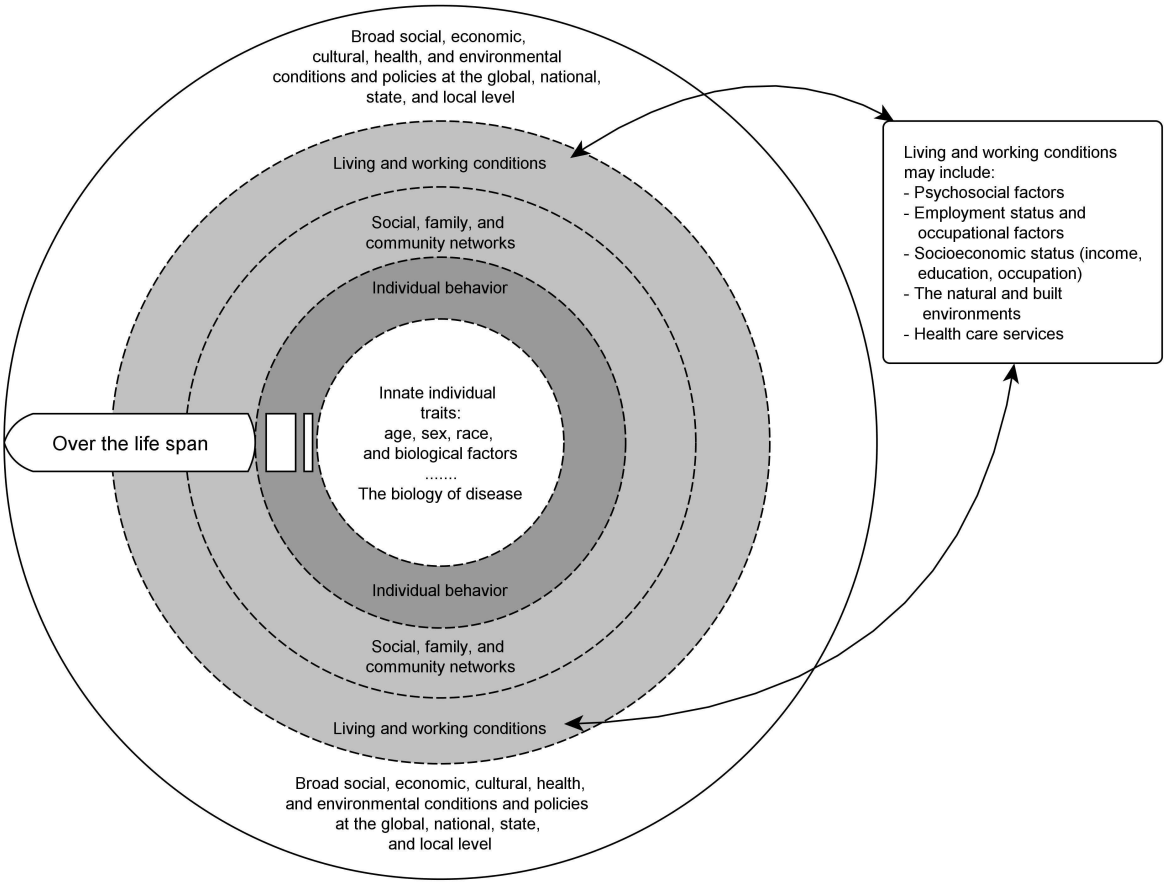


Figure 2: Determinants of health; Source: Committee on Assuring the Health of the Public in the 21st Century (2002), p. 52

The next two sections will present and discuss relevant individual (chapter 1.3.2) and macro level (chapter 1.3.3) determinants of child and adolescent health and in how far the SES plays a role regarding some of the important predictors.

1.3.2 Individual level determinants of health

Family, peers, and school are important social contexts for children and adolescents, which act as important contributors towards a healthy psychosocial development (Hurrelmann, 2002). The next section will highlight important aspects of these social contexts and their influence on child health and well-being.

Family

The family is perhaps the most important context for healthy development in children and adolescents (Hurrelmann, 2006). Within the family, children learn and adopt good or bad health habits (Wilkinson & Marmot, 2003), as well as behaviors which help them later on to function in society (Erhart & Ravens-Sieberer, 2008; Ravens-Sieberer et al., 2005). Moreover, families are the place where strong bonds and relationships can be a source of social and emotional support. The experience of warmth, closeness and intimacy can positively influence a child's development and can help them become resistant against negative factors. A number of family factors, such as positive relationships with one's parents and a structured family have a protective effect (Faltermajer, 2005). Good relationships with parents are likely to be even more important than peer relationships (Moreno et al., 2009), whereas especially poor relationships with parents can have negative consequences for well-being (Rask et al., 2003). Furthermore, poor relationships with parents as well as a non-intact family structure are potential risk factors regarding certain risk behaviors, such as alcohol consumption (Shucksmith et al., 1997). Another study showed that not living with both biological parents was associated with a greater risk for negative health outcomes (Dawson, 1991). But also the social position and income situation of the family determine a child's health. Children who grow up under adverse conditions have a higher mortality and morbidity, practice unhealthy behavior, have higher injury rates, and are less likely to take part in preventive health care services (Hurrelmann, 2006). The impact of parental employment status, however, is less clear and seems to vary by culture (Sleskova et al., 2006).

School

Children and adolescents spend a large fraction of their time at school. Even after regular school hours, children often engage in various after-school activities. Consequently, school is an important setting influencing children's health behaviors. Main areas of research have examined the role of school satisfaction, school bonding, academic achievement, and school-related stress (Ravens-Sieberer et al., 2005). School-related stressors can be social, such as

bullying, or academic, such as schoolwork pressure, and studies have confirmed their negative effects on health (e.g., Hjern et al., 2008; Natvig et al., 1999; Natvig et al., 2003). Several studies show that perception of fairness and experience of teacher support is important for child satisfaction with school (Samdal et al., 1998), their health and well-being (Lenzi et al., 2012; Natvig et al., 2003; Santinello et al., 2009). Relationships with teachers and peers are an important protective factor for well-being (Lindberg & Swanberg, 2006). Similarly, the perception of teacher support, as well as peer support are relevant predictors of happiness (Natvig et al., 2003; Samdal et al., 1998). Underlining these findings is a recent study of Bergh et al. (2011) in which health complaints in children and adolescents were strongly associated with social relationships with both, teachers and peers. This is in line with Santinello and colleagues who showed that peer/classmate support is associated with lower chance of headache (Santinello et al., 2009).

School is also an important setting for health promotion and prevention of risk behaviors and many programs and interventions are applied in this setting. A review on school contextual factors (Sellström & Bremberg, 2006) revealed that having a health or anti-smoking policy, good school climate, high SES status, and an urban area location was positively associated with less smoking, higher well-being, less problem behavior, and better school achievement. A number of studies have shown that a positive climate in school has a positive effect on well-being (Freeman et al., 2009; Konu et al., 2002; Mooij, 1998; van den Oord & Rispen, 1999).

Peers

During adolescence, peer relationships intensify and become increasingly more important in the lives of young people. Friendships are an important determinant for a number of positive health outcomes, such as happiness and well-being (Due et al., 2003). Apart from spending time together, peers are an important source of support. Relationships with peers complement parent-child-relationships and are necessary for a healthy development (Dorius et al., 2004). Risk for negative developments may emerge when adolescents don't feel accepted by their peers, or get excluded. A form of social exclusion is through bullying and empirical observations have shown that it has a severe impact on health and well-being (Due et al., 2005). These may manifest as physical symptoms, but also depression and anxiety have been observed (Fekkes et al., 2006).

1.3.3 Macro level determinants of health

There is substantial evidence from research on social determinants of health for a social gradient in health and illness (Marmot et al., 2008). Although a review of studies could not confirm a direct effect of income inequalities on population health (Lynch et al., 2004), evidence from other studies suggests that there are at least associations. Over the past years, research on social determinants of health has been enriched by politically-oriented studies investigating the role of welfare regime and political orientation in population health. Researchers, such as Bambra, Eikemo, Esping-Andersen, Espen Dahl and Mackenbach have shaped recent research on the effects of welfare regime typology on population health. From all the studies looking at various characteristics of welfare states – such as, educational health inequalities (Eikemo et al., 2008b), unemployment (Bambra & Eikemo, 2009), income-based inequalities (Eikemo et al., 2008a) – only a few have looked at effects in child populations (e.g., Richter et al., 2012; Zambon et al., 2006).

In order to allow a better characterization of research on national indicators of health in children and adolescents, a review of studies on the macro level effects in child and adolescent subjective health was performed. The purpose of the review was two-fold: to assess the scope of this research field, and to review the main results of the studies and the variables used to investigate macro level effects. The studies which were included in the review are shown in Table 1. Only studies which fulfilled the selection criteria² are included. It is important to stress the fact that the results only include studies conducted in child and adolescent samples. This means that studies using wider age groups (e.g., covering both adults and children) were not considered and are not listed in Table 1. The review also excluded studies that only addressed welfare regime types and did not investigate the effects of specific macro level determinants (Bambra et al., 2008; Richter et al., 2012; Zambon et al., 2006).

²Children or adolescents (age group 11-17); Subjective health or health behavior as outcome variable; Comparative research, i.e. more than one country included; Primarily European-based countries; At least one macro level determinant included in the analysis (excl. studies only focusing on welfare regime typology); Cross-sectional study; Published in the last 12 years (2000-2012); Published in English

Table 1: Overview of cross-sectional studies on macro level effects in children's subjective health or health behavior

Reference	Data source/ Analyzed sample	Countries	Subj. health / Health behavior outcome(s)	Macro level determinant(s)	Key finding(s)
Elgar et al. (2005)	<ul style="list-style-type: none"> ▪ HBSC 2001/02 ▪ N=162,305 ▪ Ages: 11, 13, 15 	34 European and North American countries	Alcohol consumption Drunkness	<ul style="list-style-type: none"> ▪ GDP per capita (US\$) ▪ Gini-index 	<ul style="list-style-type: none"> ▪ Income inequality associated with drinking freq. (11- & 13-yrs) ▪ Drunkenness was associated with income inequality only in 11-year-olds ▪ Sex, family affluence status (FAS), and GDP with no effect on association between income inequality and drinking behavior
Elgar et al. (2009)	<ul style="list-style-type: none"> ▪ HBSC 2005/06 ▪ N=66,910 ▪ Age: 11 	37 European and North American countries	School bullying	<ul style="list-style-type: none"> ▪ GDP per capita (US\$) ▪ Gini-index 	<ul style="list-style-type: none"> ▪ Income inequality was associated with higher rates of bullying ▪ Family and school support were associated with less frequent bullying, but not peer support
Holstein et al. (2009)	<ul style="list-style-type: none"> ▪ HBSC 2005/06 ▪ N=194,353 ▪ Ages: 11, 13, 15 	37 European and North American countries	Subjective health complaints	<ul style="list-style-type: none"> ▪ GNP per capita ▪ Gini-index 	<ul style="list-style-type: none"> ▪ GNP and health complaints (HC) were not associated ▪ Gini-index was highly associated with HC ▪ FAS and HC were not associated in 6 countries ▪ Macro level indicators were responsible for some of the socioeconomic variation in HC at individual level
Levin et al. (2011)	<ul style="list-style-type: none"> ▪ HBSC 2005/06 ▪ N=58,364 ▪ Age: 13 	35 European and North American countries	Life satisfaction	<ul style="list-style-type: none"> ▪ GDP per capita (US\$) ▪ Gini-index 	<ul style="list-style-type: none"> ▪ Higher Life Satisfaction in countries with more equal income distribution ▪ Signif. country diffs (controlled for age, family structure & FAS) ▪ Effects of GDP and Gini-index on Life Satisfaction depended on FAS; at country level, associations were stronger for GDP ▪ In countries with lower income/more unequal distribution of income, higher FAS had a greater impact on Life Satisfaction
Olsen & Dahl (2007)	<ul style="list-style-type: none"> ▪ European Social Survey (ESS) ▪ N=38,472 ▪ Ages: 15 or older 	21 European countries	Subjective health	<ul style="list-style-type: none"> ▪ Public social expenditure on health ▪ GDP per capita ▪ Social trust ▪ Gini-index ▪ Alcohol consump. p.a. 	<ul style="list-style-type: none"> ▪ GDP showed the highest explanatory power ▪ Economic satisfaction, meeting with friends, family or colleagues were highly related to health; education with a positive effect on health ▪ Approx. 40% of betw. country variance explained by macro factors
Rathmann et al. (submitted)	<ul style="list-style-type: none"> ▪ HBSC 2005/06 ▪ N=134,632 ▪ Ages: 11, 13, 15 	27 European and North American countries	Self-rated health Subjective health complaints	<ul style="list-style-type: none"> ▪ GNP per capita (US\$) ▪ Public Health Expenditure (% of GNP) ▪ Gini-index 	<ul style="list-style-type: none"> ▪ High income inequality and liberal welfare regime type were associated with more HC ▪ GNP and public health Expenditure were not related to HC ▪ SRH was lowest in countries with liberal welfare regime type ▪ Significant interaction between GNP, public health expenditure, income inequality and SES for SRH only
Torsheim et al. (2004)	<ul style="list-style-type: none"> ▪ HBSC 1997/98 ▪ N=94,915 ▪ Ages: 11, 13, 15 	22 European and North American countries	Self-rated health	<ul style="list-style-type: none"> ▪ Area deprivation score ▪ (GDP per capita of 1997 for cross-validation used) 	<ul style="list-style-type: none"> ▪ Consistency of social inequalities at indiv.level across countries ▪ Psychosocial factors as mediators betw. material deprivation & SRH
Torsheim et al. (2006)	<ul style="list-style-type: none"> ▪ HBSC 1997/98 ▪ N=120,381 ▪ Grades: 6, 8, 10 	27 European and North American countries	Self-rated health	<ul style="list-style-type: none"> ▪ Average household income per capita ▪ Gini-index ▪ Life expectancy at birth 	<ul style="list-style-type: none"> ▪ Association between less even distribution of material resources & low SRH ▪ Linear gradient between level of material inequality and SRH

The majority of the studies in the review focused on self-rated health or health complaints as the primary health outcome, and used the Gini-index, GDP, or GNP as a national level determinant to study macro level effects on child and adolescent health. All studies used samples from multiple countries and multiple age groups. Although the evidence on macro level effects on child health is less clear than in adults, the studies confirm that national level factors are important determinants of health at population level and evidence for at least indirect effects on children's health is visible. There seems to be a connection between the level of income inequality and health complaints (Holstein et al., 2009). Satisfaction with life in children also seems to correspond with national wealth (GDP) (Levin et al., 2011), suggesting that factors at global level at least indirectly reflect on children's health.

1.4 Research needs

Upon the background of a changing morbidity (Palfrey et al., 2005), there has been an increased interest in the assessment of health in children and adolescents from a subjective perspective. Subjective health assessments provide information of an individual's inner state (i.e., that what cannot be observed or measured directly) (Erhart et al., 2006). Moreover, subjective data provides important hints about an individual's health condition that has not yet been diagnosed or where morbidity has not yet fully developed (Varni et al., 2005). In the past, research on subjective health has primarily concentrated on adults, but now increasingly includes children and adolescents. Upon the backdrop of increasing globalization, there is a need for more cross-national studies assessing the health situation of individuals in different cultural contexts (Ravens-Sieberer et al., 2009). Focus on single item outcomes and methodological differences between studies are some of the current hindering factors limiting the comparability and interpretation of research findings in this area (Ravens-Sieberer et al., 2009). An advantage of studies with multi-national samples is that they open the possibility of investigation of multi-level effects, including factors at national level. As shown by the review of studies in the previous chapter, effects of macro level factors on children's subjective health have been largely unexplored and to this point almost solely focused on macro-economic determinants. Also missing in research on child health are trend analyses in subjective health and an investigation of cross-national patterns in reporting of subjective health outcomes. HBSC study is one of the few studies, which has systematically collected comparable data on multiple outcomes across a large number of countries for a long time period. HBSC data provides the unique opportunity to analyze trends in subjective health outcomes and to investigate the changing effects of different factors on children's health across time. This has been done for several European countries before on selected outcomes

(e.g., for health complaints in Latvia (Gobina et al., 2007), Austria (Dür et al., 2011), and Sweden (Hagquist, 2010)), but has not been done comprehensively for multiple outcomes. In Germany, trends on subjective health in children and adolescents have not been reported previously. Representative HBSC surveys have been conducted in Germany since 2001/02 thus providing a unique opportunity to analyze such trends (Ottova et al., 2012c).

Within the changing morbidity patterns, mental health issues and chronic diseases are of growing importance in the population of children and adolescents. Well-being and quality of life measures are tools to assess the impact of these conditions on subjective health. Screening tools can help in the early identification of existing problems (Varni et al., 2005) and are thus essential for prevention. An example of a highly prevalent chronic condition in children and adolescents of Western industrialized countries that has a negative impact on subjective well-being is overweight. A cross-national evaluation of the impact of overweight on children's health-related quality of life can deliver important insight into the variations of experienced burden in children and adolescents in different countries and cultural settings. Assessment of cross-national differences is important in international priority setting in public health (Ravens-Sieberer et al., 2009).

2 Aims and research questions

There are two main aims of this Thesis. The first aim is to examine the subjective health situation and well-being of children and adolescents cross-nationally including a description of current trends in Germany. The second aim is to assess the burden of mental health problems and overweight in children and adolescents and their impact on subjective well-being. Associated with these two aims are two specific objectives: 1) To describe patterns of subjective health reporting and to identify groups of children with low subjective health; and 2) To study the effects of individual- and macro level factors on different subjective health outcomes in children and adolescents. Subjective health and well-being are studied using a multi-national sample and a German national sample of children and adolescents, and the results are published in six papers. These six papers that form the empirical basis of this Thesis address various aspects of subjective health. All of them are based on children's self-reported data on subjective health. For each paper, research questions and objectives are formulated.

Subjective health and well-being in cross-national comparison (Paper 1)

The first paper of the Thesis begins with a general overview of the current status of subjective health in children and adolescents. It explores cross-national differences in self-rated health,

life satisfaction, and health complaints, and compares the prevalence of low health regarding these main subjective health outcomes.

Objective:

To examine subjective health patterns across sociodemographic and socioeconomic groups and to investigate the prevalence of different subjective health types in children and adolescents in cross-national comparison.

Research questions:

- Which sociodemographic and socioeconomic differences emerge in the patterns of subjective health in a multi-national sample of children and adolescents in Europe, North America, and Israel?
- What are the prevalence rates of different subjective health types in a multi-national sample of children and adolescents in Europe, North America, and Israel?

Cross-national mental health measurement in children and adolescents (Paper 2)

Against the background of the changing morbidity patterns, the second paper builds upon the first paper and assesses the mental health situation of children and adolescents cross-nationally. This is done using the KIDSCREEN-10. Because the psychometric properties of the KIDSCREEN-10 – when used without the KIDSCREEN-52 or -27 instruments – were not tested before, another aim of the paper is to test its potential as a screening tool for low mental well-being in different samples of children and adolescents.

Objective:

To test the psychometric properties and to describe the measurement results of the KIDSCREEN-10 Mental Health Index in children and adolescents from 15 European countries.

Research questions:

- Can the psychometric properties of KIDSCREEN-10 be retained when the instrument is used alone (i.e., not in combination with KIDSCREEN-52 or KIDSCREEN-27)?
- Does the KIDSCREEN-10 show the same patterns of association using the HBSC international data from 15 countries as in the KIDSCREEN study (i.e., health complaints and low SES associated with lower KIDSCREEN scores; girls reporting lower KIDSCREEN values; differences in gender increasing with higher age)?

Individual and macro level effects on young adolescent's health (Paper 3)

Building upon the results from the first two papers showing cross-national variation in children's subjective health and mental well-being, the third paper aims to gain a better understanding of the underlying factors behind the cross-national differences. Using a multi-level approach, factors at individual- and at national level are examined.

Objective:

To investigate the role of social factors at an individual and national level on subjective health complaints in a cross-national sample of young adolescents.

Research questions:

- What is the relationship between individual level social determinants, such as family, school, peers, and subjective health complaints of young adolescents in cross-national sample?
- What is the relationship between macro level factors (e.g., the Human Development Index) and subjective health complaints of young adolescents in cross-national sample?
- What are the combined effects of individual- and country-level factors on health complaints of young adolescents in cross-national comparison?

Trends in subjective health from a German perspective (Paper 4)

Reflecting the findings from the first paper which observed large cross-national differences and distinct patterns in subjective health by age, gender and family affluence status (FAS) the fourth paper examines relevant age and gender patterns across time and explores their association with children's subjective health using the German national trend data.

Objective:

To analyze the trend in subjective health outcomes, and to explore the relationship between age, gender, FAS, and weight status (BMI) on subjective health outcomes in children and adolescents.

Research questions:

- What trend can be observed for subjective health, life satisfaction, and subjective health complaints in 11-, 13-, and 15-year-old children and adolescents in Germany between 2002 and 2010?
- Which gender and age patterns emerge for this time period?

- How can the relationship between different sociodemographic, socioeconomic, and physical factors, and subjective health of 11-, 13-, and 15-year-old children and adolescents in Germany best be described?

Well-being and mental health in Germany (Paper 5)

The subjective health situation of children and adolescents in Germany described in the fourth paper is extended by an intensified focus on mental health and well-being from the ill-mental health perspective in paper five. Social context factors, such as those examined in paper three, are examined to identify public health needs at individual- and national level.

Objective:

To describe the mental health situation of German children and adolescents by age, gender, and socioeconomic status and to investigate the relationship between low health-related quality of life (HRQoL) respectively mental health problems and social context factors in children and adolescents.

Research questions:

- Which trend pattern can be observed for HRQoL in 11-, 13-, and 15-year-old children and adolescents in Germany for 2006 and 2010?
- Which social context factors (family, peers, and school) are associated with low HRQoL respectively mental health problems in children and adolescents in Germany?

Comparison of well-being in overweight children and adolescents in Europe (Paper 6)

The presence of mental health problems as addressed in the fifth paper highlights the negative consequences that children and adolescents may experience when not in full health.

Overweight is another major public health problem with widespread relevance and substantial burden on the individual and society. Prevalence of overweight has increased worldwide and increasing prevalence rates have been observed especially in children and adolescents. The sixth paper therefore examines the potential impact of overweight on well-being as it compares across countries and for different sub-groups.

Objective:

To analyze the impact of overweight on HRQoL in a European sample of children and adolescents.

To explore differences in HRQoL between overweight and normal weight children and adolescents in a multi-national sample.

Research questions:

- How does HRQoL in overweight children and adolescents compare with HRQoL of normal weight children and adolescents?
- Which domains of HRQoL show the greatest degree of impairment in overweight children and adolescents when controlling for age, gender, FAS, and parent education?
- What are the country-specific differences in the domains of HRQoL impairment in overweight children and adolescents?
- What are the age- and gender-specific differences in HRQoL on the identified domains of greatest impairment differentiated by weight status (overweight vs. normal weight) across all countries?

3 Data sources

Two main data sources were used for the analyses in this Thesis: the Health Behaviour in School-aged Children (HBSC) survey and the European KIDSCREEN study. The next sections provide relevant information on the two studies and samples that were used in the statistical analyses.

3.1 Health Behaviour in School-aged Children (HBSC) survey

One main source of data was the Health Behaviour in School-aged Children (HBSC) study. The HBSC study is an international WHO-collaborative cross-national survey carried out in over 40 countries in Europe, North America, and Israel every four years. The study was initiated in 1982 by researchers from Finland, Norway, and Austria (Aarø et al., 1986). The aim of the study is to “to make a significant contribution to scientific knowledge and understanding of adolescent health through development of theory, production of empirical data, and innovation in survey methodology” (Currie et al., 2009, pp. 135-136). All countries participating in the HBSC survey follow a standardized protocol for data collection. The standardized protocol defines the terms of sampling, questionnaire items, and the means of survey administration. The survey is conducted in a representative sample of 11-, 13-, and 15-year-old schoolchildren with target mean ages 11.5, 13.5, and 15.5. The requirement is that a minimum of 95% of the eligible target population is within the sample frame. The sample is drawn using cluster sampling whereby the primary sampling unit is school class (or school, if school class is not possible). Approximately 1,500 schoolchildren are needed for each of the three age groups, resulting in a minimum of 4,500 children from each country. Participation in the survey is voluntary, assurance being provided with regards to confidentiality and

anonymity. All countries participating in the survey are required to obtain legal and ethical approval in the respective institutions in their countries (Roberts et al., 2009).

The international coordination of the HBSC study is run by Prof. Candace Currie at the University of St. Andrews in Scotland. Data is managed and overseen by the data bank manager Prof. Oddrun Samdal at the University of Bergen, Norway.

HBSC Data was used in five papers of this Thesis, whereby the first three papers used different samples than papers four and five. The international HBSC data from the survey in 2005/06, which took place in 41 countries in Europe, North America, and Israel was used in papers one, two, and three, whereas papers four and five used the German HBSC trend file which was based on German data only from 2002, 2006, and 2010.

3.2 European KIDSCREEN study

The second source of data was the European KIDSCREEN study. The KIDSCREEN study took place in 13 European countries and was a part of the KIDSCREEN project, which was funded by the European Commission within the 5th Framework Program (Ravens-Sieberer et al., 2006). The aim of the project was to develop a cross-culturally standardized instrument enabling assessment of children's and adolescents' HRQoL. Representative samples of children and adolescents between 8 and 18 years of age were drawn from each country, whereby the countries used different sampling strategies (Berra et al., 2007): telephone sampling followed by mail survey (6 countries), school sampling and school survey (four countries), and school sampling with mail survey (1 country), and multistage random sampling of communities and households (1 country). One country combined two sampling methods. The cross-sectional survey took place in 2003, except for Ireland, which collected data in 2005.

The data from the KIDSCREEN study formed the empirical basis for the sixth paper. To assure better comparability between countries, the analyses were based on ten countries only (N=13,041). The main reason for this was missing data and/or low numbers of children and adolescents in one of the weight categories.

4 Empirical findings

The following section will present the main results of the papers in the order of their appearance on page iii. An in-depth discussion of the results in the context of the research questions and implications for research, policy, and practice will follow in chapter five.

4.1 Paper 1

Subjective health, symptom load and quality of life of children and adolescents in Europe (Ravens-Sieberer et al., 2009)

The objective of the first paper was to examine and characterize different subjective health patterns under consideration of sociodemographic and socioeconomic factors and to assess the prevalence of the different subjective health types across countries. Using the international HBSC data from 2005/06, subjective health outcomes (self-rated health, life satisfaction, and subjective health complaints) were analyzed in a sample of 11-, 13-, and 15-year-old children and adolescents from 41 countries in Europe and North America. Each of the health outcomes were dichotomized according to the HBSC standard as outlined in the HBSC Protocol (Ravens-Sieberer et al., 2005; Ravens-Sieberer et al., 2010b). The countries were ranked in the order of prevalence (in %) of the three specific health problems (poor or fair self-rated health, low life satisfaction (score 1-5), two or more health complaints weekly). Next, the associations between the different subjective health outcomes and sociodemographic factors (age, gender, socioeconomic status) were analyzed. In order to characterize the subjective health patterns of the sample of children and adolescents and to compare their prevalence across countries better, four groups of subjective health types were formed: three specific health problems and one generalized health problem (i.e. existence of two or more specific problem areas). A fifth group “healthy” included those children who did not report negatively on any of the three outcomes, i.e. who reported good or excellent self-rated health, high life satisfaction (score 6-10), and less than two health complaints weekly. Results showed that a majority of the children and adolescents were healthy (56.1%). From all three subjective health outcomes, health complaints were the most frequently reported negative health outcome (19.1%) compared to those who reported low life satisfaction respectively poor or fair self-rated health (each 4.7%) or a combination of at least two health problems (5.2%). Girls, older adolescents, and individuals from low SES groups had a higher chance (OR) of low subjective health (i.e., poor or fair self-rated health, low life satisfaction, multiple recurrent health complaints) than their respective reference group.

In country comparison, Macedonia, Malta, and Austria reported the lowest prevalence on low self-rated health, low life satisfaction, and multiple recurrent health complaints (respectively), whereas Ukraine, Switzerland, and Turkey reported the highest (respectively). Prevalence of the different subjective health types varied by country and revealed the following: The prevalence of the “healthy” group was highest in Austria (70.6%) and lowest in Turkey (29.9%). In contrast, the prevalence of the “unhealthiest” group (i.e., those who reported negatively on all three outcomes) ranged between 1.1% in Macedonia and 9.5% in Turkey. Overall, the results show that subjective health status in children and adolescents differs substantially across countries, and is strongly determined by sociodemographic and socioeconomic factors.

The previous paper has shown that subjective health status of children varies cross-nationally and shows distinct age-, gender-, and SES-specific patterns. Given the importance of mental health, the second paper tested the psychometric properties of KIDSCREEN-10 Index and used it to analyze the mental health situation of children in 15 European countries.

4.2 Paper 2

Measuring mental health and well-being of school-children in 15 European countries using the KIDSCREEN-10 Index (Erhart et al., 2009)

The objective of this paper was to test the psychometric properties and measurement results of the KIDSCREEN-10 Mental Health Index in children and adolescents from 15 European countries. The international HBSC study data from 15 European countries (Austria, Belgium, Bulgaria, Germany, Greenland, Luxembourg, Macedonia, Portugal, Romania, Russia, Slovenia, Spain, Switzerland, Turkey, and United Kingdom) on N=78,383 schoolchildren ages 11, 13, and 15 years was used for the analyses. Cronbach's alpha was calculated to assess internal consistency of item responses and KIDSCREEN-10 items were tested in terms of whether they fulfill assumptions of the Rasch partial credit model; for this purpose, infit mean square residuals were calculated. Analyses were first conducted for the entire sample, and then group analyses were performed by age, gender, and countries. Mean differences between age-, gender-, and SES groups were calculated by means of ANOVA, and effect sizes were reported using Cohen criteria (Cohen, 1988). Correlations with the health complaints symptom checklist (HBSC-SCL) and with the Strengths and Difficulties Questionnaire (SDQ) total score were reported. Results showed that KIDSCREEN-10 displays good psychometric properties as a stand-alone instrument. Across all 15 countries, the average KIDSCREEN-10 score was 47.5 (SD=9.7). Country comparisons revealed a large effect ($d=0.76$) with the highest average score reported in Austria (50.7) and the lowest in Russia (43.2). All of the a priori defined hypotheses could be confirmed. Girls, older children, and individuals with low SES reported lower KIDSCREEN-10 scores. Gender differences showed a small effect ($d=0.24$), a medium effect could be found for age differences ($d=0.58$), and a small-medium effect emerged for SES differences ($d=0.46$). Gender differences increased with higher age. Both, health complaints (HBSC-SCL) and mental health problems (SDQ Total difficulties score) showed a medium-large correlation with KIDSCREEN-10 (0.48 resp. -0.49). A priori hypothesized associations between each construct and low KIDSCREEN-10 values were confirmed. The results provide support for the application of KIDSCREEN-10 as a screening tool for low mental well-being.

The previous two papers highlighted the cross-national differences in children's subjective health and well-being, including mental health status. Important socioeconomic and sociodemographic patterns emerged, but the presented associations lack inclusion of broader social context determinants. The third paper therefore examined the association between various social context determinants at individual level and children's health. The HDI was included in the analyses as a determinant at national level to investigate macro level effects. Health complaints were the primary outcome as these emerged as highly relevant for children's subjective health in paper one.

4.3 Paper 3

The Role of Individual and Macro-level Social Determinants on Young Adolescents' Psychosomatic Complaints (Ottova et al., 2012b)

The objective of the third paper was to investigate the relationship between different social determinants and the occurrence of health complaints from a stress perspective in a multi-national sample of young adolescents (11- and 13-year-olds only). Using the international HBSC data from 2005/06, data on N=98,773 young adolescents were analyzed in 34 European countries. The main outcome of interest were subjective health complaints, which were analyzed as health complaints mean item score (Ravens-Sieberer et al., 2008a) and as multiple recurrent health complaints (defined as two or more health complaints occurring more than once weekly). The stress perspective was used to investigate the effect of social determinants (family, peer, and school factors), socioeconomic and sociodemographic factors at individual level, as well as the Human Development Index (HDI) at the macro level, on health complaints. The data were analyzed using a random intercept random slope (at country level) multi-level linear and logistic regression. Results showed that young adolescents confronted with stress-inducing factors, such as not living with both biological parents, experiencing difficult communication with one's parents, but also a variety of factors related to social relationships and interactions, for instance being bullied, experiencing high school pressure and/or negative class climate, were associated with a higher chance of worse psychosomatic health. High media use and a low family affluence status were also associated with higher risk for health complaints. In particular, communication with one's parents (mother: OR=1.43; father: OR=1.63), being bullied (OR=2.08) and school pressure (OR=1.79) emerged as the greatest stressors and were associated with the highest chance for multiple recurrent health complaints. The negative effects of negative class climate and school pressure on the health complaints mean item score were more pronounced for girls than for boys.

At country level, HDI was associated with better psychosomatic health, and age and media use moderated the effect between HDI and health complaints. The decreasing effect of higher age was lower in countries with high HDI, whereas high media use was associated with a greater decreasing effect on health complaints in countries with high HDI.

The results provide further support for macro level effects on child health and make clear that future research needs to use a broader approach in the study of factors influencing child health.

The three previous papers, in particular papers one and two, highlighted the importance of age, gender, and family affluence status and showed that subjective health status is significantly related to these factors. What the results did not show, however, is how stable these relationships are over time and whether these associations are valid at national level as well. Using the German HBSC data, the fourth paper therefore explored trends in the three main subjective health outcomes and examined age and gender effects and their relationships with subjective health status over time.

4.4 Paper 4

Trends in der subjektiven Gesundheit und des gesundheitlichen Wohlbefindens von Kindern und Jugendlichen in Deutschland: Ergebnisse der Health Behaviour in School-aged Children Studie (HBSC) 2002 bis 2010 [Trends in Subjective Health and Well-Being of Children and Adolescents in Germany: Results of the Health Behaviour in School-aged Children (HBSC) Study 2002 to 2010] (Ottova et al., 2012d)

The objective of this paper was to describe the trend in subjective health in children and adolescents and to analyze the effect of age, gender, FAS, and weight status (Body Mass Index, BMI) on subjective health outcomes. The data used were the German HBSC trend data from the surveys 2002 (N=5,650), 2006 (N=7,274) and 2010 (N=5,005) conducted in 11-, 13-, and 15-year-old schoolchildren. In addition to the three subjective health measures (self-rated health, life satisfaction, and subjective health complaints), a combined index of well-being was built. Items were dichotomized and trends were reported for poor or fair self-rated health, high life satisfaction, and multiple recurrent health complaints (using standard HBSC cut-offs) (Currie et al., 2012; Ravens-Sieberer et al., 2010b). Separate logistic regression analyses were conducted for each of the four outcomes controlling for age, gender, FAS, and BMI. Results showed a decreasing trend for fair or poor self-rated health across all age groups and for both genders for the eight-year time period (2002–2010). An exception to the general trend was the group of 11-year-old boys who showed an increase in fair or poor self-rated health for this time period. The decreasing trend was more pronounced in girls than in boys (-2.6% vs. -0.4%) and the overall level of fair or poor self-rated health was higher in girls than in boys. The prevalence of fair or poor self-rated health increased positively with age. The trend in life satisfaction was less obvious and showed a substantial drop in 2006 for 13-year-old girls (-7.4%), and for 15-year-old boys (-4.8%) and girls (-8.7%). This deviation from the general pattern did not emerge in the international sample. With increasing age, gender differences became more pronounced, favoring boys. The trend in multiple recurrent health complaints showed an upside down U-shape, with an increase between 2002 and 2006, and a

decrease between 2006 and 2010. Gender differences increased with higher age, and older adolescents, as well as girls reported the highest level of health complaints. Differentiated analyses showed that the most frequently reported health complaints were sleeping difficulties, followed by irritable/bad mood, and headache. The combined trend of all three health outcomes showed a positive increasing trend in high well-being. In the logistic regressions, female gender, higher age, low FAS, and overweight emerged as risk factors for poor health (i.e., were associated with a higher chance of fair or poor self-rated health, low life satisfaction, multiple recurrent health complaints, low well-being).

Overall, the results present a positive picture of the health situation in children and adolescents in Germany and point at positive developments.

The second paper of the Thesis stressed the importance of mental health and its assessment in international, as well as national studies, and showed that KIDSCREEN-10 is a suitable index for screening for low mental well-being in international studies. To explore the burden of mental health problems in children and adolescents in Germany, and in order to gain a better understanding of underlying factors behind mental health problems, associations with social context determinants were investigated using the German HBSC data set in paper five.

4.5 Paper 5

Gesundheitsbezogene Lebensqualität und psychische Gesundheit von Kindern und Jugendlichen in Deutschland: Ergebnisse aus der deutschen HBSC-Studie 2006–2010 [Health-related Quality of Life and Mental Health of Children and Adolescents in Germany: Results from the German HBSC Study 2006-2010] (Ravens-Sieberer et al., 2012)

The aim of the fifth paper was to compare HRQoL-levels in children and adolescents in 2006 and 2010 by age, gender, and SES, and to investigate the relationship between low HRQoL respectively mental health problems and social context factors. Using German HBSC data from 2006 (N=6,896) and 2010 (N=4,723), the prevalence of high, normal, and low HRQoL was reported using the KIDSCREEN-10. Mental health problems were assessed via the Strengths and Difficulties Questionnaire (SDQ). An extreme group analysis was conducted by means of logistic regressions for a) low HRQoL (KIDSCREEN T-value < 40) and b) mental health problems (SDQ-value > 19) as outcome variables. Demographic and social factors included in the analyses were: gender, SES, communication with parents, number of friends, time with friends, attitude towards school, and support from classmates. The majority of the respondents reported normal to high HRQoL (2006: 85.1%; 2010: 86.5%) and there were no significant differences between both survey years. Extreme group comparisons (high vs. low HRQoL) showed that a significantly higher number of children and adolescents with low HRQoL reported worse health. Regression analyses revealed that gender only played a role for HRQoL, but not for mental health problems. Low SES, difficult communication with parents, spending little time with friends, a negative attitude towards school, and receiving little support from ones classmates were all significantly associated with low HRQoL and mental health problems. Communication with parents and school attitude emerged as highly relevant. The paper addresses the negative impact of mental health problems on children's well-being and draws attention to the importance of social context factors, in particular relationships with family, friends and classmates, and school.

Besides mental health, overweight is another major public health issue that has received widespread attention. Children and adolescents who are overweight are at an increased risk for serious health problems and impairments later in life. In particular, there is a great chance of detrimental effects on subjective health and overall well-being, as results from paper four indicate. The sixth paper therefore examined the subjective health situation of children and adolescents in cross-national comparison. A specific focus was placed on age and gender groups, as these two determinants emerged as relevant in the previous papers of this Thesis.

4.6 Paper 6

Overweight and its impact on the health-related quality of life in children and adolescents: Results from the European KIDSCREEN survey (Ottova et al., 2012a)

The objective of the sixth paper was to analyze the impact of weight status on HRQoL and to explore HRQoL-differences between overweight and normal weight children and adolescents in a multi-national European sample. Data from ten European countries that participated in the European KIDSCREEN study was analyzed. The analyzed sample consisted of N=13,041 children and adolescents 8 through 18 years of age. HRQoL was assessed using the KIDSCREEN-52 instrument, and weight status was defined using the gender- and age-specific cut-offs of Cole et al. (2000). Overweight and obesity were collapsed into one category “overweight”. Univariate analyses of covariance (ANCOVA) were performed and partial eta square was calculated to measure effect strength using the two weight groups: overweight and normal weight. Results revealed a significant detrimental effect of overweight on HRQoL across all age and gender groups and irrespective of country of origin. Overweight children and adolescents reported greatest HRQoL impairment on their physical well-being ($\eta^2_p=0.012$) and self-perception ($\eta^2_p=0.021$). Social acceptance in association with bullying was strongly affected as well ($\eta^2_p=0.006$). All three dimensions emerged as the most important ones across all countries suggesting that HRQoL impairment on these dimensions is a universal finding. Girls and older adolescents reported greater HRQoL impairment than their male and younger counterparts.

This paper highlights the relative importance of weight status as a cross-culturally independent determinant of HRQoL in children and adolescents.

5 Discussion and implications

The six papers that form the basis of this Thesis provide important insight into the subjective health situation of children and adolescents in Germany and across Europe, North America, and Israel. Although the papers differ in terms of their health outcomes, data samples, and perspectives, their unifying feature and commonality is that subjective health is the primary outcome of interest. Each of the papers provides results which are relevant for the main research aims of this Thesis and contributes to the existing knowledge on children's subjective health and well-being. In this sense, the heterogeneity of the papers is in fact a strength, as together the papers can provide a richer body of evidence to support the main messages which emerge out of the results. The next section will highlight the main results from each paper that are relevant for the overall research aims of this Thesis.

5.1 Summary of results

Paper one begins by conveying a positive impression of children's subjective health and showing that a majority of the children and adolescents in Europe, North America, and Israel are healthy (56%). Detailed analyses by sociodemographic and socioeconomic factors revealed that girls, older children, and low affluent groups reported the lowest subjective health. The highest prevailing subjective health problem (poor or fair self-rated health, low life satisfaction, health complaints) in all participating countries were multiple recurrent health complaints, which were reported by 19% of the respondents. The prevalence of subjective health outcomes varied by country and showed distinct patterns.

Cross-national differences also emerged for mental well-being, measured by means of the KIDSCREEN-10, and showed the same sociodemographic and socioeconomic patterns (Paper 2). Girls, older children, and low affluent groups had the greatest risk for low mental well-being in the 15 European countries analyzed. The results provide support for application of KIDSCREEN-10 as a screening tool for low mental well-being in national and cross-national samples.

The third paper extended the findings of the first paper by observing that subjective health complaints were associated with a number of individual, but also a macro level factor in 34 European countries and Canada. In particular, stress-inducing factors, such as poor social relationships, school-related problems (schoolwork pressure, bullying), but also national level factors, such as the Human Development Index (HDI), were related to health complaints (i.e., worse health). More positive economic factors (higher family affluence status, higher HDI) were related to better health. Girls were at greater risk for health complaints and a negative class climate and more school pressure increased their chance of poor health further.

Observations across time using a German sample (Paper 4) showed that over a period of eight years (2002-2010), children report better subjective health, but girls report worse health and with increasing age this gender difference becomes larger. Compared to 2002, the prevalence of health complaints was slightly higher in 2010, but lower than in 2006.

Observations on the effects of social context factors on mental health and well-being were deepened on a German sample (Paper 5) and confirm previous results (Paper 3), which highlight the importance of parental communication and school. In particular, a negative attitude towards school and difficult communication with one's parents were strongly associated with low HRQoL and mental health problems, as measured via the SDQ.

Upon the background of increasing chronic morbidity, the burden of overweight was assessed in the sixth paper and results revealed lower HRQoL in overweight boys and girls as compared to their normal weight peers. Overweight children were particularly affected on their physical well-being and self-perception, and also in areas of social life.

Based on the evidence emerging out of these six papers and the research aims that were formulated for this Thesis, the following main messages can be formulated:

1. Cross-national comparisons and German trends reveal a comparably high burden of health complaints and indicate that girls, older children, and low affluent groups are at greatest risk for low subjective health and well-being.
2. Feelings about school and social relationships with parents, peers, and teachers are important determinants of good subjective health and mental well-being.
3. National level factors can contribute towards a better understanding of the underlying factors influencing child health.
4. Mental health problems and overweight are related to a greater risk for compromised health and a lower health-related quality of life.

The following discussion will address each of these main messages under consideration of the theoretical background and research literature. Implications for research, policy, and practice will be made in chapter 5.4.

5.2 Discussion of results

Although children and adolescents still represent the population group with the highest level of good health in developed countries, their health situation has undergone changes over the past decades, which are attributable to the global changing morbidity patterns and the rise of chronic conditions (Palfrey et al., 2005; Perrin et al., 2007). Large societal shifts, including the introduction of modern technology, globalization, changing work conditions, new forms

of family constellations, and modern lifestyle, have had significant consequences on the health of young people worldwide (Blum & Nelson-Mmari, 2004). The traditional view that childhood and adolescence represent the healthiest phase of life is increasingly challenged by findings, which point at subgroups of young people who are at heightened risk for compromised health.

Cross-national comparisons and German trends reveal a comparably high burden of health complaints and indicate that girls, older children, and low affluent groups are at greatest risk for low subjective health and well-being.

As paper one showed, the majority of children and adolescents report high levels of subjective health and do not have serious health problems. Still, at the international level, 19% reported to have at least two complaints weekly (Ravens-Sieberer et al., 2009). In Germany, nearly 30% of 13- and 15-year-old girls reported symptoms, indicating that health complaints are a widespread health problem. Especially the burden of sleeping difficulties, irritability/bad mood, and headache was high in the German sample of children and adolescents. Although the prevalence of children experiencing such symptoms on a regular basis has not necessarily increased over the course of the eight years (Ottova et al., 2012d), it is too early to make prognoses about a downward trend just on the basis of the 2006-2010 trend. Long-term observations and international trends on health complaints will reveal whether the (seemingly) decreasing trends in Germany (Ottova et al., 2012d) and in Austria (Dür et al., 2011) continue and whether they apply to other countries in Europe as well.

The presented empirical evidence suggests that not all children and adolescents currently experience their full health potential. Several of the papers presented here provide supporting evidence for age- and gender-specific differences. Previous studies which came to the same conclusions have suggested that these reflect the normal developmental process (e.g., Cavallo et al., 2006; Goldbeck et al., 2007). Girls and boys differ in terms of the developmental tasks they face and they engage in different coping behaviors (Pinquart & Silbereisen, 2002). In the present study, girls reported higher rates of health complaints (Ottova et al., 2012d), which may have biological reasons (e.g., onset of menstruation), and/or may reflect their higher willingness to report symptoms (Dür et al., 2011). Health complaints are also more stress-related and it is known that girls react to stress differently than boys (Sundblad et al., 2008). Several studies have observed increasing gender-differences with higher age (Dür et al., 2011; Gobina et al., 2007). In the present study, larger gender differences emerged for life satisfaction and self-rated health than for health complaints (Ottova et al., 2012d). Also, a lower family affluence status and higher age were associated with worse health suggesting

that nearing adulthood, which is associated with factors, such as assuming more responsibility, completing school education, and pursuing further education, but also the domestic economic situation, challenge children's health and well-being.

Some children experience considerable psychosocial health problems during adolescence (Piko et al., 1997). Previous research has shown that social relationships are essential for a healthy development. Good parental communication and a stable family structure can help reduce the chance of poor health (Berntsson & Kohler, 2001; Brodin Laftman & Ostberg, 2006; Moreno et al., 2009). In this Thesis, children living with a step-parent had a higher chance of health complaints than those in single parent households. Interestingly, children living in a different family constellations (i.e., neither with both parents, nor with a single parent, nor with a step-parent), had the highest odds of poor health (Ottova et al., 2012b). Family structure is often related to economic factors and although this association was not specifically investigated in this Thesis, both, low FAS and a non-intact family structure were related to a higher chance of health complaints (Ottova et al., 2012b).

Feelings about school and social relationships with parents, peers, and teachers are important determinants of good subjective health and mental well-being.

At school, children are confronted with a variety of psychosocial stressors. Academic pressures, as well as fear of failure, are forms of psychosocial tension which can trigger symptoms (Eriksson & Sellstrom, 2010; Holler-Nowitzki, 1994; Hurrelmann et al., 1988). High expectations from parents or teachers, or perceived schoolwork pressure, are likely to intensify the symptoms. Apart from school-work pressure, social relationships may also exert negative stress. Good relationships with teachers are important for well-being (Griebler et al., 2010). Perceived teacher unfairness was associated with a higher chance of headache (Lenzi et al., 2012; Santinello et al., 2009). Few friends and spending little time with them was also associated with lower HRQoL and a greater chance of mental health problems (Ravens-Sieberer et al., 2012). At the same time bullying raised the chance two-fold for health complaints (Ottova et al., 2012b). The third paper of this Thesis did not investigate whether having more friends or better relationships reduced the risk of bullying, but there is evidence from research pointing to a possible buffering effect of high quality peer relationships against victimization (Hodges et al., 1999). In general, interaction with peers can either have positive, but also negative consequences for health (Kuntsche et al., 2009).

National level factors can contribute towards a better understanding of the underlying factors influencing child health.

Not only individual level factors, but also meso-level and macro level factors play a role for psychosocial health. Country-level characteristics, such as education, national welfare characteristics (Chung & Muntaner, 2007; Eikemo et al., 2008b), public social expenditure on health and GDP (Olsen & Dahl, 2007), are relevant determinants of health at population level. Only a few studies have examined these macro level determinants. From macro level studies, the results on effects on subjective health are less consistent. The review in chapter 1.3.3 revealed that frequently used indicators are GDP/GNP and the Gini-index. The lack of a significant association between GDP/GNP and subjective health and/or health behavior (Elgar et al., 2005; Holstein et al., 2009; Rathmann et al., submitted) may be due to the fact that these are single outcome indicators, which may be too specific.

To overcome some of the previously mentioned challenges, the composite indicator HDI was used in paper three to investigate macro level effects on child health. Although the effects were small, the positive association between HDI and health (Ottova et al., 2012b) supports existing evidence pointing at macro level effects on child health, while also hinting at important interaction effects between micro and macro level factors. Long-term studies using a broader spectrum of indicators at multiple levels can shed more light into the underlying mechanisms and the relationship between micro and macro level factors.

At global level, a rising burden of overweight and mental health problems has been observed (de Onis et al., 2010; Palfrey et al., 2005; Wang & Lobstein, 2006). The detrimental effects on individual health have been addressed by researchers studying well-being and HRQoL (Schwimmer et al., 2003; Williams et al., 2005). The sixth paper (Ottova et al., 2012a) extended these findings by showing that HRQoL impairment due to overweight occurs regardless of cultural background.

Mental health problems and overweight are related to a greater risk for compromised health and low health-related quality of life.

Strongest effects for the physical well-being and self-perception confirm other studies (Wille et al., 2010; Williams et al., 2005). The fact that social acceptance emerged as the third most relevant area of impairment in overweight children (Ottova et al., 2012a) further supports the importance of psychosocial factors (Shoup et al., 2008; Tyler et al., 2007).

Similarly, mental health problems pose a serious burden on the individual, as well as society. Policy reports (WHO, 2001), but also research articles and studies (Erhart et al., 2009;

Ravens-Sieberer & Kurth, 2008) stress the importance of mental health in children. It is difficult to draw conclusions on global trends in mental health problems based on present data, but a systematic literature review on German studies suggests that mental health pathology has remained fairly stable over the past decades (Barkmann & Schulte-Markwort, 2004). Poor mental health has been observed as a substantial risk factor for low HRQoL (Rajmil et al., 2009). The findings in paper five confirm this and point to an increased risk in girls, older adolescents, and children from low affluent families (Ravens-Sieberer et al., 2012). Social factors, such as communication with parents, spending time with friends, and attitude towards school emerged as important determinants for mental health problems and low HRQoL (Ravens-Sieberer et al., 2012). In particular, the nearly five-fold higher odds of mental health problems in children with a negative attitude towards school, was striking. Due to the cross-sectional nature of the data, it is difficult to determine the direction of causality, but results clearly show that school plays an important role for children's health.

On the one side, the papers in this Thesis present a generally positive picture of children's subjective health. On the other side, they also point out the emerging burden of mental health, overweight, and health complaints and indicate areas of public health relevance. The next section will discuss the methodological limitations associated with the data sources, the measures, and the analytical approach used in this Thesis.

5.3 Methodological considerations

5.3.1 Study design

The HBSC Study is a cross-sectional study that is conducted based on a standardized research protocol (Roberts et al., 2009). One of the strengths of the survey is its large sample size enabling cross-cultural comparisons across more than 40 countries in Europe, North America, and Israel (Currie et al., 2012). Another outstanding feature of the HBSC study is its standardized methodological approach that follows a protocol that is obligatory for all participating countries. The protocol is revised and updated prior to each survey for quality assurance. Data collection procedure is identical in all participating countries and questionnaires have a common mandatory section, which enables robust cross-country comparisons. The survey procedure is identical for each survey and even though causal inferences cannot be made on account of the cross-sectional nature of the data, the survey has high value from the policy perspective as it permits the study of trends using data from multiple survey years (Roberts et al., 2009). The survey is based on self-reported data that is collected in schools during a class period. The focus on this age group (11-, 13-, and 15-year-

olds) permits a developmental perspective in the study of health and health behaviors of children and adolescents at a time period that marks the onset of adolescence (Currie et al., 2009; Roberts et al., 2009). At the same time, this narrow age range puts limitations on the generalizability of the findings for the entire group of children and adolescents as it excludes very young children and older adolescents – the latter a group, which is in the transition phase between adolescence and adulthood, and thus another important age phase for studying health and health behaviors. HBSC is a school-based study whereby only regular schools are sampled. This puts limitations on the transferability of the findings to other population groups, such as children in special needs schools, and minority groups.

The KIDSCREEN study, which formed the basis for the analyses in the sixth paper, was a cross-sectional study as well, but with a different purpose and objective. The primary objective of the study was the development of HRQoL instruments as part of a European project (Ravens-Sieberer et al., 2006). In contrast to the HBSC study, the KIDSCREEN study covers a broader age spectrum (8-18-year-olds) and includes parent-reported data in addition to children's self-reports. Data collection procedure differed slightly in the 13 participating countries, and the response rates varied, especially for parents (Ravens-Sieberer et al., 2006).

5.3.2 Measurement and indicators

An important characteristic and strength of both studies is their use of validated and robust measures of health and well-being. HBSC is one of the very few studies, which uses a variety of subjective measures on different dimensions of health for children and adolescents simultaneously (Ravens-Sieberer et al., 2005). The validity of KIDSCREEN-10 as a suitable instrument for assessing mental well-being was confirmed in the second paper of this Thesis (Erhart et al., 2009). It was previously used in the Flash Eurobarometer Survey on parental views of their children's well-being in the 27 EU Member States (Gallup Organization, 2009). KIDSCREEN-10 belongs to a family of HRQoL instruments and is in fact a measure of global well-being (HRQoL) covering physical, psychological, and social aspects of HRQoL (Ravens-Sieberer et al., 2006). In this Thesis it was used as both, a measure of mental health and well-being (Paper 2) as well as a measure of global HRQoL (Paper 5). Although this may seem conceptually "blurred", it is justified upon the fact that mental health and well-being are conceptually related and positively associated (see also chapter 1.1). Furthermore, the 10-item scale of KIDSCREEN was found highly correlated with other mental health scales in the KIDSCREEN study (Ravens-Sieberer et al., 2006). A major strength of the KIDSCREEN instruments is that they were developed cross-culturally using the simultaneous approach and

that they have all been tested in terms of validity and reliability, both within the KIDSCREEN study, as well as in the HBSC Study (Erhart et al., 2009; Ravens-Sieberer et al., 2007; Ravens-Sieberer et al., 2008b; Ravens-Sieberer et al., 2010a). Currently, such instruments are still rare (Erhart et al., 2006).

Similarly, health complaints were not only used as a measure of symptoms, but were also referred to as an indicator of physical well-being (see also chapter 1.2) respectively indicator of mental health (cf. Erhart et al., 2009; Hagquist, 2010). Health complaints cover somatic and psychological symptoms and contain aspects of psychosocial health. According to the theoretical framework of HBSC, when used with self-rated health or life satisfaction, they can be used as screening instruments (Ravens-Sieberer et al., 2010b). However, the use of single item measures, such as self-rated health and life satisfaction, is associated with some limitations and has been generally discouraged (Loo, 2002). It is also important to note that clinical data is missing, thus imposing certain limitations on the interpretation of data (Ravens-Sieberer et al., 2009). This needs to be taken into account as mental health issues are sensitive information (cf. Ravens-Sieberer et al., 2012), and obtainment of this data may be biased. The assessment of height and weight involves similar kind of problems. In the sixth paper, parent-reported data on children's height and weight was used instead to overcome the bias associated with self-reported data (Ottova et al., 2012a). Thus, care needs to be taken when interpreting data, especially when reporting prevalence rates.

Despite the use of validated and cross-culturally suitable instruments, the evidence from the multi-national comparisons raises the question after the role of culture and cultural factors in explaining differences in health outcomes. The subjective health and well-being measures applied in the HBSC study currently challenge the culturally-appropriate interpretation of the findings as it is not possible to infer from these whether observed differences in health are real differences, or whether these are artifacts resulting from different interpretations of the construct(s) by the children in the different cultures (Ravens-Sieberer et al., 2009). Common indicators and measurement tools on mental health and well-being in children currently still lack adequate cultural adaptation (Ottova et al., 2012e). The assessment of cultural effects in this Thesis was limited to the analysis of cross-national differences and associations between macro level and individual health outcomes. The selection of HDI as macro level indicator in the study of health differences in children and adolescents across countries was based on two features: First of all, HDI is a composite indicator of a nation's prosperity. Secondly, looking at the literature, it has not been used in large-scale multi-national study focusing children's

health and health behaviors before. In general, the selection of indicators at macro and at individual level is not always unproblematic and careful consideration is necessary. The HDI was put forward by the United Nations Development Programme (UNDP) with the purpose to overcome deficiencies of GNP (Noorbakhsh, 1998a, 1998b). Despite its advantages compared to single outcome indicators, such as GNP, the HDI has also been heavily criticized. The main issues are its redundancy, collinearity with its components, and the fact that it provides only little more information than the GDP (McGillivray, 1991). Despite this criticism, the use of the HDI in this Thesis was beneficial, as it enriches the literature on macro level effects in children's health, which has previously been limited to primarily single-dimensional macro level indicators, such as Gini-index, GDP/GNP.

5.3.3 Analytical strategy

There are two issues regarding the analytical approach and the data used in this Thesis that need to be discussed. One issue is the trend file that was used in the fourth paper (Ottova et al., 2012d). Methodological details about the German HBSC trend file have been published previously (Ottova et al., 2012c). One important aspect to mention is that the three German HBSC surveys differ in terms of sample composition and thus observed deviations from the expected patterns may be the result of methodological variance. The second issue regards the multi-level analyses and the exploration of macro level effects. Multi-level analyses are increasingly being used in research, but there are some methodological challenges associated with this. The HBSC study uses a cluster sampling procedure whereby school or class builds the primary sampling unit (Roberts et al., 2009). Children and adolescents were surveyed in classroom units and thus observations at individual level are not completely independent of one another, as it is likely that individuals in one group liken each other more than individuals from different groups (Maas & Hox, 2004). This type of data generally requires more sophisticated statistical analysis procedures, such as multi-level analysis (Maas & Hox, 2004). Data which is collected at individual level can be combined with aggregated data to examine factors at different levels simultaneously (Diez-Roux, 1998). Such ecological studies are useful when the main interest lies in the investigation of environmental factors located at different levels and how these impact individual health (Curtis & Cummins, 2007). A major strength is that a multitude of determinants including macro level factors can be investigated. At the same time there is a risk of making incorrect deductions and engaging in ecological fallacy if not being cautious in the use of appropriate units of analysis (individual vs. group) (Diez-Roux, 1998).

5.4 Implications and conclusions

A final reflection of the findings in this Thesis confirms that subjective health research has undergone major advances over the past years and there has been heightened activity in this field. As pointed out in chapter one, there is still a lack of a consensus and clear definitions for some of the concepts. The interchangeable use of terms and concepts limits comparability of data and thus hinders an overarching cross-national view on the issue. It became evident that there is a need for a stronger theoretical foundation, with more theory-directed research and theory-based studies, especially in children and adolescents (Huebner, 2004). Apart from this, there is a need for more cross-national/cross-cultural research, which goes beyond cross-sectional data. Longitudinal research on factors affecting well-being over the life course, across time and across countries could deliver important insight on how lifestyles and family structures, the current economic situation, and other factors, affect well-being, and how these relationships changes over time. A stronger incorporation of meso- and macro level factors could strengthen the body of evidence and reveal how these different levels interact and which pathways they take in influencing child health. Conceptual understanding and interpretation of construct meaning is subject to cultural variation, and thus response pattern variation may reflect cultural differences (Ravens-Sieberer et al., 2009). Currently it is difficult to know whether observed health differences are real or whether they reflect different understandings of the concept.

In order to strengthen research in this area, it is first of all important that there is more clarity on the conceptualization of the subjective health and well-being outcomes. Secondly, appropriate assessment tools and measures need to be developed, which are developmentally, cross-culturally, and gender-appropriate. Apart from the development of culturally-sensitive measures, health promotion programs need to adapt to the respective cultural context they are applied within (Ottova et al., 2012b). Thirdly, there is a need for a closer connection between theory and research (Huebner, 2004). Theories need to account for cross-cultural differences (Oishi et al., 1999), as consideration of cultural factors is currently still lacking in research on children and constitutes an important under researched area (Morrow & Mayall, 2010).

According to the WHO, “Mental health and well-being are fundamental to quality of life, enabling people to experience life as meaningful and to be creative and active citizens. Mental health is an essential component of social cohesion, productivity and peace and stability in the living environment, contributing to social capital and economic development in societies” (WHO, 2005, p. 1). The high burden of psychosocial problems on individuals and society, and their consequences on daily life is high (e.g., high absenteeism, higher use of health

services) (Belmaker et al., 1985). Often, individuals suffer from multiple symptoms causing substantial burden on both, the individual and society (Brosschot, 2002; Currie et al., 2012; Mikkelsen et al., 1997; Petersen et al., 1997). To address the high burden of mental health, overweight, and health complaints – as identified in this Thesis – it is important that age-appropriate screening tools are developed. The importance of social context factors in children's subjective health and well-being highlights the need for more investment into programs focusing on strengthening social relationships and improving school environmental factors, such as creating a more child-friendly learning environment and preventing bullying. Focus on families and parent-child-relationships is important, and measures should work towards strengthening families and assuring equal health opportunities for all children, by providing more support to those in greater need.

Research can contribute towards addressing these public health issues by strengthening monitoring and by developing better screening tools, which again form the basis for decision making and allocating funds at the political level. Screening is an essential tool for the identification of problems and in the provision of appropriate treatment. Monitoring through routine data collection is essential for service planning (Maughan et al., 2005), and enables health care services to adapt to the changing morbidity patterns, in particular in the provision of child health services. Collection of objective, clinical data can deliver more accurate information, which is an important prerequisite for health monitoring and provides an important basis for decision making in policy. The analysis of trends can shed light into children's subjective health development over longer time periods. Health monitoring by means of trend analysis is an important tool for policy and program evaluation (Rosenberg, 1998). It gives hints about effectiveness of interventions (Roberts et al., 2009), and is useful for planning purposes and projections. Moreover, trend data give important insight on shifting patterns in health behaviors and may provide first clues about future developments.

Subjective indicators of health are valuable for policy making at European level as they assess an individual's personal experience and do this in a manner that considers cultural differences – in other words: „by allowing people to assess their lives on their own terms rather than on the basis of what is objectively considered ‚the good life‘ by an outside observer“ (Watson et al., 2010, p. 7). Especially in children and adolescents such information can be beneficial, as their needs may differ greatly by age, gender, and cultural background.

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Abstract

Background

Changing morbidity patterns and the growing importance of mental health and chronic conditions on the international public health agenda have both contributed to a widespread interest in subjective health outcomes. In particular research in children and adolescents has witnessed an increase in activity over the past years. Although subjective health in children and adolescents has been extensively studied, comparative research across countries and cultures as well as across time is rare. The study of factors at macro level and their association with subjective health at individual level are poorly investigated areas in this population group.

Research aims

One of the main aims of this Thesis was to explore cross-national differences in subjective health and well-being of children and adolescents in Europe, North America, and Israel, and to describe the trend of subjective health and well-being in children and adolescents in Germany. A secondary aim included the investigation of the role of individual and national level determinants of subjective health in a cross-national sample. Another central aim of this Thesis was to assess the burden/prevalence of mental health problems and overweight in children and adolescents and their impact on subjective well-being.

Methods

The Thesis comprises six papers, which are based on data from the international Health Behaviour in School-aged Children (HBSC) Survey and the European KIDSCREEN Study. In the Thesis, two different HBSC data sets were used: The first three papers used the international HBSC Data from the 2005/06 survey which took place in 41 countries in Europe, North America, and Israel and included N=204,534 schoolchildren ages 11, 13, and 15 years. The analyses in paper four and five were based on the German HBSC trend data from the survey years 2002 (N=5,650), 2006 (N=7,274), and 2010 (N=5,005). Paper 6 used the KIDSCREEN Survey data collected in 13 European countries in 2003. A total of N=22,827 children and adolescents ages 8 through 18 years were surveyed.

Results

In general, the majority of children and adolescents in Europe, North America, and Israel report good subjective health (Paper 1) and German trends indicate a positive development over the past eight years (Paper 4). Trend analyses further showed that girls report worse health and with increasing age this gender difference becomes larger (Paper 4). Detailed

analyses revealed that girls, older children, and low affluent groups report the worst health including lowest mental health and well-being (Paper 1, 2, 4 and 5). The prevalence of subjective health outcomes (self-rated health, life satisfaction, and health complaints) varied across countries and revealed distinct patterns (Paper 1). Psychometric analyses performed on KIDSCREEN-10 confirmed it as a suitable screening tool for low mental well-being in national and cross-national samples (Paper 2). Multi-level analyses on social determinants of health showed that stress-inducing factors, such as poor social relationships, school-related problems (schoolwork pressure, bullying), but also national level factors, such as the Human Development Index (HDI), were related to worse health (Paper 3). A negative attitude towards school and having difficulty talking with one's parents were strongly associated with low well-being and mental health problems (Paper 5). Well-being was also lower in overweight boys and girls as compared to their normal weight peers. Overweight children and adolescents were particularly affected on their physical well-being and self-perception, but also in areas of social life ("social acceptance/bullying") (Paper 6).

Conclusions

The results portray a comprehensive picture of children's and adolescents' subjective health and well-being cross-nationally and over time. The large data sets deliver robust evidence with important implications for research, policy, and practice, but also highlight under researched areas. First of all, future research needs to concentrate on providing clarity in terms of the conceptualization of subjective health and well-being. Secondly, measurement tools need to be developed which are developmentally, cross-culturally, and gender-appropriate. Strengthening of monitoring and consideration of cultural factors constitute a third important area for development. Given the lack of sufficient knowledge on the role of macro level factors in subjective health of children and adolescents, more research is needed to explore associations, in particular for cultural aspects. These can provide further insight on the identified cross-national differences in subjective health that became apparent in the papers of this Thesis.

Zusammenfassung

Hintergrund

Die veränderte Morbiditätslage und die zunehmende Bedeutung der psychischen Gesundheit und chronischer Beschwerden auf der internationalen Public Health Agenda haben zu einem breiten Interesse für subjektive Gesundheitsoutcomes beigetragen. Vor allem die Forschung zu Kindern und Jugendlichen hat im Laufe der letzten Jahre deutlich zugenommen. Trotz umfassender Forschungsaktivitäten zur subjektiven Gesundheit von Kindern und Jugendlichen ist eine vergleichende länder- und kulturübergreifende Forschung, wie auch die Erforschung von Trends, derzeit noch selten. Die Erforschung von Faktoren auf der Makroebene und deren Beziehung zur subjektiven Gesundheit auf individueller Ebene stellt eine weitere Forschungslücke in dieser Populationsgruppe dar.

Forschungsfragen

Eines der zentralen Ziele dieser Dissertation war die Untersuchung von Länderunterschieden in der subjektiven Gesundheit und des Wohlbefindens bei Kindern und Jugendlichen in Europa, Nordamerika und Israel, sowie die Beschreibung der Trends in der subjektiven Gesundheit und des Wohlbefindens von Kindern und Jugendlichen in Deutschland. Ein zweites Hauptziel bezog sich auf die Untersuchung der Rolle der individuellen und länder-spezifischen Determinanten der subjektiven Gesundheit in einer multi-nationalen Stichprobe. Ein weiteres Ziel dieser Dissertation war es, das Ausmaß bzw. die Prävalenz der psychischen Auffälligkeiten und des Übergewichts, und deren Auswirkungen auf das subjektive Wohlbefinden von Kindern und Jugendlichen zu erfassen.

Methoden

Die Dissertation basiert auf sechs Publikationen, die auf den Daten aus der internationalen Health Behaviour in School-aged Children (HBSC) Studie und der europäischen KIDSCREEN Studie beruhen. Zwei verschiedene HBSC-Datensätze wurden in der Dissertation herangezogen: die ersten drei Publikationen basieren auf Daten der internationalen HBSC Studie 2005/06 welche in 41 Ländern in Europa, Nordamerika und Israel stattgefunden hat und Daten von N=204,534 Schulkindern im Alter von 11, 13, und 15 Jahren erhoben hat. Die Analysen im vierten und fünften Paper basieren auf dem deutschen Trenddatensatz, der auf Basis der Daten aus den Survey-Jahren 2002 (N=5,650), 2006 (N=7,274), und 2010 (N=5,005) entwickelt wurde. Das sechste Paper bezieht sich auf Daten aus der KIDSCREEN Studie, die 2003 in 13 europäischen Ländern mit N=22,827 Kindern und Jugendlichen zwischen 8 und 18 Jahren durchgeführt wurde.

Ergebnisse

Insgesamt zeigen die Ergebnisse, dass die Mehrheit der Kinder und Jugendlichen in Europa, Nordamerika und Israel über eine gute subjektive Gesundheit berichten (Paper 1) und dass für den Zeitraum der letzten acht Jahre in Deutschland eine positive Entwicklung zu verzeichnen ist (Paper 4). Trendanalysen haben weiter gezeigt, dass Mädchen über eine schlechtere subjektive Gesundheit berichten, und die Geschlechterunterschiede mit zunehmendem Alter zunehmen (Paper 4). Detaillierte Analysen haben verdeutlicht, dass Mädchen, ältere Kinder und Individuen aus niedrigeren Wohlstandsverhältnissen die schlechteste subjektive Gesundheit angeben, und die niedrigste psychische Gesundheit bzw. Wohlbefinden besitzen (Paper 1, 2, 4 und 5). Die Prävalenz der verschiedenen subjektiven Gesundheitsoutcomes (selbstberichtete Gesundheit, Lebenszufriedenheit und gesundheitliche Beschwerden) variierte zwischen den Ländern und wies deutliche Muster auf (Paper 1).

Analysen zu den psychometrischen Eigenschaften von KIDSCREEN-10 haben gezeigt, dass es ein geeignetes Instrument für ein niedriges psychisches Wohlbefinden ist (Paper 2). Multi-level Analysen zu den sozialen Determinanten der Gesundheit haben gezeigt, dass stress-induzierende Faktoren, wie beispielsweise schlechte soziale Beziehungen, schulbezogene Probleme (Leistungsdruck, Mobbing), aber auch Faktoren auf der Länderebene, wie zum Beispiel der Human Development Index (HDI), mit einer schlechteren Gesundheit assoziiert sind (Paper 3). Eine schlechte Einstellung zur Schule und Kommunikationsprobleme mit den eigenen Eltern standen in enger Beziehung zu einem niedrigen Wohlbefinden und dem Auftreten von psychischen Auffälligkeiten (Paper 5). Bei übergewichtigen Kindern und Jugendlichen war das Wohlbefinden ebenfalls niedriger im Vergleich zu deren normalgewichtigen Gleichaltrigen. Übergewichtige Kinder waren insbesondere im Bereich des physischen Wohlbefindens und der Selbstwahrnehmung, aber auch im Bereich des Soziallebens beeinträchtigt („soziale Akzeptanz/Mobbing“) (Paper 6).

Schlussfolgerungen

Die Ergebnisse skizzieren länderübergreifend und im Zeitverlauf ein umfassendes Bild der subjektiven Gesundheit und des Wohlbefindens von Kindern und Jugendlichen. Die großen Datensätze liefern eine robuste Evidenzbasis mit wichtigen Implikationen für die Forschung, Politik und Praxis, und weisen somit auf relevante Forschungslücken hin. Als erstes zu erwähnen ist der Bedarf an einer klaren Konzeptualisierung der Begriffe der subjektiven Gesundheit und des Wohlbefindens. Als zweites ist es erforderlich, dass Messinstrumente entwickelt werden, die entwicklungspezifisch, kulturübergreifend und geschlechtsspezifisch sind. Einen dritten wichtigen Bereich stellen die stärkere Verankerung des Monitorings und

die Berücksichtigung kultureller Faktoren dar. Forschung zu Faktoren auf der Makroebene kann dazu beitragen, das Wissen auf diesem Gebiet zu erweitern, insbesondere hinsichtlich der Betrachtung kultureller Aspekte und der Zusammenhänge mit der subjektiven Gesundheit von Kindern und Jugendlichen. Diese wiederum können Erkenntnisse zu den identifizierten Länderunterschieden in der subjektiven Gesundheit liefern, die in den Manuskripten dieser Dissertationsarbeit deutlich wurden.

Ehrenwörtliche Erklärung

Ich versichere, dass ich die Arbeit selbständig verfasst und keine anderen Quellen und Hilfsmittel als die angegebenen benutzt, sowie die Stellen der Arbeit, die anderen Werken entnommen sind, unter Angabe der Quelle als Entlehnung kenntlich gemacht habe. Das gilt auch für die verwendeten Abbildungen.

Ich versichere, dass die vorliegende Arbeit nicht anderweitig in dieser Form als Dissertation eingereicht wurde und ich bisher auch keine weiteren Versuche zur Promotion unternommen habe.

Bielefeld, den 02.11.2012

Veronika Ottova

Appendix

Publication list of the Dr. PH candidate

Publications in journals

Ravens-Sieberer, U., **Ottova, V.**, & das HBSC-Team Deutschland (2012). Kinder- und Jugendgesundheit in Deutschland: Erkenntnisse aus der Health Behaviour in School-aged Children (HBSC)-WHO-Jugendgesundheitsstudie 2002-2010 [Child and Adolescent Health in Germany: Findings from the Health Behaviour in School-aged Children (HBSC)-WHO-Youth Health Survey 2002-2010]. *Das Gesundheitswesen*, 74 (Suppl. 1), pp. 4-7.

Ottova, V., Hillebrandt, D., Kolip, P., Hoffarth, K., Bucksch, J., Melzer, W., Klocke, A., Richter, M., Ravens-Sieberer, U., & das HBSC-Team Deutschland (2012). Die HBSC-Studie in Deutschland – Studiendesign und Methodik [The HBSC Study in Germany - Study Design and Methodology]. *Das Gesundheitswesen*, 74 (Suppl. 1), pp. 8-14.

Ottova, V., Hillebrandt, D., Ravens-Sieberer, U., & das HBSC-Team Deutschland (2012d). Trends in der subjektiven Gesundheit und des gesundheitlichen Wohlbefindens von Kindern und Jugendlichen in Deutschland: Ergebnisse der Health Behaviour in School-aged Children Studie (HBSC) 2002 bis 2010 [Trends in Subjective Health and Well-Being of Children and Adolescents in Germany: Results of the Health Behaviour in School-aged Children (HBSC) Study 2002 to 2010]. *Das Gesundheitswesen*, 74 (Suppl. 1), pp. 15-24.

Ravens-Sieberer, U., **Ottova, V.**, Hillebrandt, D., Klasen, F., & das HBSC-Team Deutschland (2012). Gesundheitsbezogene Lebensqualität und psychische Gesundheit von Kindern und Jugendlichen in Deutschland: Ergebnisse aus der deutschen HBSC-Studie 2006–2010 [Health-related Quality of Life and Mental Health of Children and Adolescents in Germany: Results from the German HBSC Study 2006-2010]. *Das Gesundheitswesen*, 74 (Suppl. 1), pp. 33-41.

Melzer, W., Oertel, L., **Ottova, V.**, & das HBSC-Team Deutschland (2012). Mobbing und Gewalt an Schulen. Entwicklungstrends von 2002 bis 2010 [Mobbing and Violence at School. Trends from 2002 to 2010]. *Das Gesundheitswesen*, 74 (Suppl. 1), pp. 76-83.

Lenzi, M., Vieno, A., de Vogli, R., Santinello, M., **Ottova, V.**, Baska, T., Griebler, R., Gobina, I., Gaspar de Matos, M. (2012). Perceived teacher unfairness and headache in adolescence: A cross-national comparison. *International Journal of Public Health*. doi: 10.1007/s00038-012-0345-1

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Ottova, V., Erhart, M., Vollebergh, W., Kokonyei, G., Morgan, A., Gobina, I., Jericek, H., Cavallo, F., Valimaa, R., Gaspar de Matos, M., Gaspar, T., Ravens-Sieberer, U. & the Positive Health Focus Group (2012b). The Role of Individual and Macro-level Social Determinants on Young Adolescents' Psychosomatic Complaints. *The Journal of Early Adolescence*, 32(1), pp. 123-158.

Menrath, I., Mueller-Godeffroy, E., Pruessmann, C., Ravens-Sieberer, U., **Ottova, V.**, Pruessmann, M., Erhart, M., Hillebrandt, D., Thyen, U. (2012). Evaluation of school-based

life skills programmes in a high-risk sample: a controlled longitudinal multi-centre study. *Journal of Public Health*, 20(2), pp. 159-170.

Ottova, V., Ravens-Sieberer, U. (2010). Social determinants in child health: reflections from the Health Behaviour in School-aged Children survey. *International Journal of Public Health*, 55(6), pp. 525-526. [Editorial]

Ottova, V., Ravens-Sieberer, U. (2010). Schulische Gesundheitsförderung bei Kindern mit Migrationshintergrund. *Public Health Forum*, 18(4), pp. 34.e1-34.e3.

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