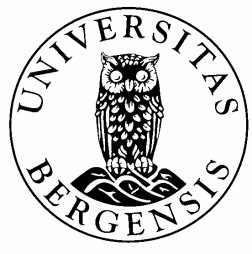

The nature of subjective health complaints in adolescence: Dimensionality, stability, and psychosocial predictors

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SUMMARY

Despite the fact that adolescence is regarded as a period in life with good health and where severe illness is uncommon, many adolescents struggle with different kinds of health complaints in their daily lives. From a preventive point of view it is crucial to gain insight into the nature of health complaints among children and adolescents, as well as their aetiology. The main purpose of the present thesis is to provide knowledge about the underlying structures in health complaints, the stability and development of health complaints, and the reciprocal relationship between psychosocial predictors in the school context and subjective health complaints in adolescence. Possible implications for the development of preventive efforts are also addressed.

The thesis consists of three papers, and the papers apply data from three different studies. Paper one is based on data from two of the studies. First, a sub-sample, consisting of 1251 Norwegian students (11 -15 year olds) from the Health Promoting Schools study (ENHPS) was used. Second, data from a nation wide study amongst 7059 Norwegian students (aged 11, 13, 15, and 16) from the Health Behaviour in School-aged Children (HBSC) study was used. In paper two, panel data from the Norwegian Longitudinal Health Behaviour (NLHB) study (n = 891) was applied. Finally, in paper three, a cohort of 386 students in Grade 8 (aged 13) from the ENHPS study was used. Analyses were mainly conducted within the Structural Equation Modeling (SEM) framework using AMOS 4.01 and 5.0.

The results of the present thesis give no clear answer to the question of dimensionality underlying subjective health complaints. However, the findings in paper one suggest that there may be two underlying dimensions in subjective health complaints that may be labelled

"somatic" and psychological" complaints, and that the two dimensions are highly correlated. All three papers in the thesis address developmental trends in subjective health complaints. While there is consistent evidence of an increase in complaints from early to mid adolescence among girls, the developmental trend is less pronounced among boys. Furthermore, the results from paper one and two indicate that differences in the developmental patterns between boys and girls result in an emergence of a gender difference that persists throughout adolescence. There is also evidence of a substantial relative stability in subjective health complaints during adolescence, reported in paper two, and an indication of an increasing relative stability with age. Finally, there is some evidence of a relationship between being bullied over time and a steeper developmental increase in subjective health complaints in paper three. Furthermore, social support from teachers and students is to some extent related to lower levels of complaints, while there is a clear relationship between support from fellow students and lower levels of being bullied across time.

The findings in the present thesis confirm that the patterns of subjective health complaints may have developed already by adolescence and that there is considerable stability in such complaints. Consequently, interventions in adolescence may also have an impact on the prevalence of complaints later in life. Furthermore, findings from the present thesis indicate that psychosocial predictors, like being a victim of bullying and social support in the school context, may be important target factors for interventions aimed at promoting psychosocial aspects of health.

LIST OF PAPERS

I. Hetland, J., Torsheim, T., & Aarø, L. E. (2002). Subjective health complaints in adolescence: Dimensional structure and variation across gender and age. *Scandinavian Journal of Public Health, 30*, 223-230.

II. Hetland, J., Aarø, L. E., Torsheim, T., & Wold, B. Stability and change in subjective health complaints from adolescence to early adulthood. Submitted.

III. Hetland, J., Freeman J., & Samdal, O. Subjective health complaints and bullying in early adolescence: A longitudinal study. Submitted.

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1. INTRODUCTION

1.1 Background

Despite the fact that adolescence is regarded as a period in life with good health and where severe illness is uncommon, many adolescents struggle with different kinds of health complaints in their daily lives. In line with the World Health Organisation's declaration from 1946, a rather broad definition of health is prevalent today. Health political strategies not only focus on severe illness and death, but also on to what extent the individual subjectively experiences well being, both psychologically and physically. As stated in the recent white paper, No. 16 - 2002/03, physical and psychological complaints are the most common causes of long-time absence from work and early retirements in Norway, bringing large expenses to the society. The fact that these kinds of complaints also are common among children and adolescents (Perquin et al., 2000; Torsheim, Välimaa, & Danielson, 2004) may indicate that they develop early in life. Furthermore, existing research shows that an increased level of health complaints is related to increased use of medicine (Holstein, Hansen, Due, & Almarsdottir, 2003), lower school achievement (Hurrelmann, Engel, Holler, & Nordlohne, 1988) , and a worsening of the quality of life of the adolescents and their families (Hunfeld et al., 2001). From a preventive point of view, it is therefore crucial to gain insight into the nature of health complaints among children and adolescents, as well as their aetiology.

The main purpose of the present thesis is to provide knowledge about the underlying structures of health complaints, the stability and development of health complaints, and the reciprocal relationship between psychosocial strain in the school context and complaints in adolescence. Possible implications for the development of preventive efforts will also be addressed.

1.1.1 A challenge for general health practice and health promotion

Throughout history, medical practitioners have encountered patients with symptoms of physical illness for which no passable organic basis can be found. The first systematic description of so-called medically unexplained symptoms is reported as far back as the middle of 18th century (Eriksen & Ursin, 2002). In Birquet's epidemiological work from 1859 he describes muscle pain, asthenia, mood, and gastrointestinal problems without any organic findings. Despite a large, and still growing, literature about the prevalence and mechanisms behind such complaints in the adult population (Brown, 2004; Ihlebaek, Eriksen, & Ursin, 2002; Pennebaker & Watson, 1991; Perquin et al., 2000), several researchers claim that the general health care system is struggling with the utilization of this knowledge in treatment and prevention of the complaints (Andersson, Ejlertsson, Leden, & Schersten, 1999; Knardahl, 2001; Mantyselka, Kumpusalo, Ahonen, & Takala, 2002).

Although recently there has been an increasing interest in such complaints among children and adolescents (Perquin et al., 2000), little is known of these children's and adolescents' use of the health care system (Haugland, 2004). Furthermore, little attention has been given to how to use existing knowledge when facing the challenge of these complaints in younger populations. Research indicates that it is essential to communicate simple and reassuring information about the normality of the complaints, in order to reduce fear and uncertainty, and to maintain normal activity (Ihlebaek et al., 2002).

Adolescence is a period in life that, in particular, is characterised by biological, psychological, and psychosocial changes that are likely to influence the experience of health complaints. It is therefore important to view the existence of complaints from a developmental perspective in order to understand and communicate the nature of complaints

in adolescence. Knowledge about prevalence and developmental patterns of complaints in adolescence is therefore likely to be of use for school health services and other personnel involved in promotion of health when facing the challenge of medically unexplained symptoms in the younger population.

1.1.2 The adolescent period

Adolescence may be defined as *the period within the life span when most of a person's biological, cognitive, psychological, and social characteristics are changing from what is typically considered childlike to what is considered adult-like* (Lerner & Spanier, 1980). In line with this definition, adolescence may partly be regarded as a cultural and social phenomenon, where its endpoints are not exclusively defined by physical milestones. The ages considered to be part of adolescence may therefore vary by culture. The World Health Organization defines adolescence as the period of life between 10 and 19 years of age (World Health Organization, 1986). By contrast, in the United States, adolescence is generally considered to begin around the age of 13, and end around 24. For descriptive purposes, the phases of early (10-13 years), mid (14-16 years), and late (17-20 years) adolescence have been used within adolescent research (Petersen & Leffert, 1995), and this classification will also be applied in the present thesis.

In both imaginative writing, like novels, short-stories, and news articles, and in early scientific writings, adolescence has been described as a period of "storm and stress" (Hall, 1904). However, the past 20-25 years of medical, biological, and psychological research make it clear that, although the individual encounters many challenges and transitions during adolescence, evidence is not consistent with this rather dramatised description of the adolescent period (Feldman, 1990; Lerner & Galambos, 1998; Petersen, 1988). Furthermore,

the adolescent period is characterised by both interindividual (between-person) differences, and intra-individual (within-person) changes in development (Lerner & Galambos, 1998). It is therefore important to address both normative patterns of development, as well as the individual variability in developmental patterns in research on adolescent health and well being.

1.1.3 The prevalence of health complaints in the younger population

An extensive amount of research on health complaints and different pain conditions in adults exists. In contrast to this research, knowledge about pain in children and adolescents is much more scarce (Perquin et al., 2000). As mentioned earlier, existing research shows that somatic and psychological complaints are also common in the younger population (Goodman & Mcgrath, 1991; Perquin et al., 2000; Torsheim et al., 2004). Furthermore, there has been an indication of an increasing trend in the prevalence of health complaints among Norwegian adolescents from the early eighties to the late nineties (Wold, Hetland, Aarø, Samdal, & Torsheim, 2000). A similar increasing trend in health complaints is also found in other Nordic countries (Berntsson & Kohler, 2001).

Although there has been an increasing focus on the epidemiology of health complaints in childhood and adolescence, some clear limitations exist within this research. Goodman and Mcgrath (1991) argue, in their review of the existing research on pain in children and adolescents, that one possible limitation within this research is that the majority of epidemiological studies investigating paediatric pain have addressed specific pain conditions (e.g., headache, abdominal pain) rather than providing a comprehensive analysis of pain problems in childhood and adolescence. Another limitation is that direct comparisons and interpretations of the results from different studies are complicated by differences in both

measurement, definition of health problems (Haugland, Wold, Stevenson, Aaroe, & Woynarowska, 2001), and age and gender of the study populations (McGrath et al., 2000). Finally, many studies examine subjects of a very narrow age range, which does not allow for examination of developmental changes in complaints (Goodman & Mcgrath, 1991).

However, recently, a few studies which address some of these shortcomings have been published. A Dutch study covering a large age range of children and adolescents (0-18 years olds) measuring multiple complaints revealed that about 25% of the respondents reported chronic pain (Perquin et al., 2000). Furthermore, in a recent cross-national survey, including 36 countries, Torsheim and co-workers (2004) report the prevalence of students, aged 11 to 15, experiencing two or more complaints more than once a week. The results from this survey show considerable variation in the prevalence across nations in the reporting of multiple complaints, ranging from 19% for the schoolchildren in countries with a low prevalence to 54% for countries with a high prevalence of complaints. The average prevalence across nations, age, and gender was 32.3%, while the average prevalence for multiple subjective health complaints in the Norwegian sample was 28.5%.

1.2 Conceptual overview and definitions

In the following section, a conceptual overview and definitions of key constructs used in the theoretical framework of the present thesis are given.

1.2.1 Subjective health complaints

Today, different diagnostic classifications for severe and long-lasting states of medically unexplained symptoms exist. In DSM-IV the relevant categories are *somatisation disorder*,

which is used when the symptoms are pronounced, and *undifferentiated somatoform disorder*, for less pronounced symptoms (American Psychiatric Association, 1994). However, the majority of individuals with health complaints have complaints that do not reach the thresholds for clinical diagnosis, and are considered to have "normal" states of complaints (Ihlebaek et al., 2002). It is therefore likely that the individuals who qualify for such diagnoses just represent a small part of those in the population who struggle with unexplained health complaints in their daily lives, and as such bring great costs upon society. Furthermore, despite the fact that symptoms of somatization disorder are common among children and adolescents, these groups rarely report enough symptoms to meet the diagnostic criteria for a somatization disorder (Garber, Walker, & Zeman, 1991).

The term Subjective health complaints has been suggested as a neutral and descriptive term for medically unexplained symptoms (Ursin, 1997). The use of this “labelling” is argued to have two major advantages. First, the term is neutral in the sense that it makes no assumptions on aetiology. In contradiction to the term psychosomatic, this term makes no supposition about the direction of the causal link between the psychic and the somatic elements. Second, it is descriptive in a broad sense in that it includes all kinds of complaints (e.g., headache, stomach-ache, back-pain, sleeping difficulties, dizziness, feeling low, nervousness, and irritability) and syndromes (e.g., chronic fatigue and irritable bowel syndrome) that are experienced by the individual, even when no medical cause can be found. The term “subjective health complaints” therefore covers the whole spectrum of complaints that affect well being in the population, and not only the tip of the iceberg covered by clinical diagnoses. Furthermore, subjective health complaints are in this way conceptualised as a continuum, whereby clinical manifestations represent only the extreme tail of a continuous distribution of health complaints (Ihlebaek et al., 2002).

In line with the description above, this term is used throughout the rest of this thesis. However, not all studies relevant for this thesis have applied such a broad definition of complaints. Studies focusing on more specific pain conditions and psychological problems are also relevant in the description of the problem area.

1.2.2 Dimensionality

A common finding is that different kinds of subjective health complaints co-occur, and that individuals experiencing multiple complaints exist in both the adult population (Liu, Clark, & Eaton, 1997; Simon, Gater, Kisely, & Piccinelli, 1996; Ursin, 1997) and the younger population (Kristjansdottir, 1997; Mikkelsson, Salminen, & Kautiainen, 1997). An important question is whether the co-occurrence of complaints results from reflections of specific underlying dimensions of complaints. The identification of underlying dimensions of subjective health complaints may have implications for both research and practice. First, revealing different underlying dimensions may imply that it is important to distinguish between the different dimensions of health complaints when studying possible predictors of subjective health complaints. Second, finding several underlying dimensions may also have implications for the interventions used by healthcare workers and in health promoting efforts. The existence of broad and general dimensions may suggest a use of more general interventions, while more specific dimensions would support the use of more specific kinds of interventions.

1.2.3 Stability

As mentioned in the beginning of this introduction section, knowledge about normative developmental patterns and inter-individual variation in the development of subjective health complaints may provide essential information for general health practice and preventive workers. In the study of developmental change and stability, it is important to make a distinction between different kinds of stability, and a useful distinction is often made between *absolute* and relative *stability* (Santor, Bagby, & Joffe, 1997).

As defined by Alsaker & Olweus (Alsaker & Olweus, 1992), absolute stability refers *to the extent to which an individual's or group's absolute level in a particular variable remains stable over time*. Relative stability, on the other hand, emphasizes *the degree to which an individual or group retains its relative position in a particular variable*. From a practical point of view, knowledge about absolute stability in adolescence may be used in order to communicate the "normality" of the complaints by identifying possible normative developmental patterns of complaints in adolescence. In contrast, knowledge about the relative stability of subjective health complaints may provide essential information about how "changeable" the complaints are, and, from a prevention perspective, indicate possible optimal times to initiate preventive interventions.

1.2.4 Bullying

The fact that some children and adolescents are frequently and systematically harassed or attacked by others is a very old phenomenon, and descriptions of such behaviours are found far back in literary works (Olweus, 1993). However, the first efforts made to study bullying systematically did not take place until the beginning of the 1970s, and in the very forefront of this research was Dan Olweus, with his studies of bullying in a Scandinavian school context

(Olweus, 1973). Today it is well-documented that bullying is a considerable problem in schools (O'Moore & Hillery, 1989; Solberg & Olweus, 2003; Whitney & Smith, 1993). Furthermore, the phenomenon of bullying is found to be prevalent across different countries (Craig & Harel, 2004), and there is a growing public and scientific interest in this phenomenon in many regions of the world.

Bullying may, according to Olweus (1999), be defined as *negative actions from one or more persons that are repeated over time, where there is an imbalance of power between the offender(s) and the victim*. In addition, a common distinction is often made between direct forms of bullying, entailing relatively open attacks on the victim, whether physical or verbal, and indirect forms of bullying, involving some form of social isolation or intentional exclusion from a third party (Olweus, 1999). From a developmental perspective, there seems to be a decreasing trend of bullying from childhood into early adolescent years (Forero, McLellan, Rissel, & Bauman, 1999; Nansel et al., 2001; Whitney & Smith, 1993).

1.2.5 Social support

"Those communities which included the greatest number of the most sympathetic members, would flourish best, and rear the greatest number of offspring" Darwin (1952/1871).

Social support may be referred to as a *social network's provision of psychological and material resources*, *intended to benefit an individual's ability to cope* (Cohen, 2004). Within research, it is common to differentiate between three different types of support: *instrumental support*, *informational support*, and *emotional support* (House & Kahn, 1985). However, studies on the structure of social support in adolescence have not been successful in

reproducing this distinction (Cause, Mason, Gonzales, Hiraga, & Liu, 1994). In contrast to this failure, a distinction between formal and informal *sources* of perceived social support has been shown to have structural importance among students in schools (Torsheim, Wold, & Samdal, 2000). According to this distinction, teachers and staff may be regarded as a more formal source of support, and classmates as more informal providers of support. In empirical studies of support, it is important to include both these support sources, as well as to examine their exclusive effect on variables of interest.

1.3 Theoretical and empirical framework

Different theoretical approaches may be used to account for the occurrence of subjective health complaints. A short review of some of these approaches is given in the following section. Furthermore, the theoretical and empirical framework for the main research questions in the present thesis is provided.

1.3.1 A developmental ecological perspective

Throughout the lifespan the health of the individual is changing, as are also contextual and intra-individual factors affecting health. Health may therefore be considered as a developmental phenomenon, and different dimensions of wellbeing are often regarded to be reciprocally related to diverse conditions in the psychosocial environment of the individual (Stokols, 1996). Consequently, ecological theories of human development may serve as an appropriate overreaching framework in order to understand the development and existence of subjective health complaints. According to Bronfenbrenner's (Bronfenbrenner, 1979) theory on the "ecology of human development," human development is influenced by multiple contextual levels, including the biological, individual-psychological, social-interpersonal, cultural, and historical. In line with this perspective, adolescent development is regarded as

involving connections among elements within these domains, and therefore no single influence acts either alone or as the "prime mover" of change (Petersen, 1988). Accordingly, it is important to take into account different contextual levels and their interconnections in order to understand the development and prevalence of subjective health complaints in adolescence. Furthermore, not only proximal influences that are closely related to subjective health complaints are regarded as important from this perspective, but also more distal and less visible influences at "higher" contextual levels should be taken into account. Thus, it is important to be aware that more visible and closely related influences to subjective health complaints in adolescence are themselves influenced by other factors at different contextual levels.

However, one consistent limitation of ecological models is the absence of theoretical concepts that can be used to explain and predict specific phenomena of interest (Grzywacz & Fuqua, 2000). It is therefore necessary to also apply more discipline-specific theories in order to explain the linkage between person-environment interactions at different levels and particular manifestations of health. In the following parts of the theoretical perspectives section of this thesis, more specific theories explaining individual differences in the experience of subjective health complaints are also presented, and possible linkages between contextual factors and health are discussed.

1.3.2 Conversion of psychic conflict

One of the earliest systematic accounts of medical unexplained illness is the concept *conversion* introduced by Breuer and Freud (1991) within psychodynamic theory. According to psychodynamic theory, the brain often tries to regulate the conscious experience of negative affect by unconsciously suppressing the conscious recall of memories associated

with personal trauma. In order to preserve the energetic balance of the brain, the negative affect may be "converted" into a symptom that was either present at the time of the original trauma, or is some kind of symbolic representation of it (Brown, 2004). Following this approach, subjective health complaints may be regarded as expressions of psychological distress, where the individual is not consciously acknowledging the underlying psychic conflict responsible for it. Furthermore, the personal traumas underlying the symptoms may have taken place earlier in life.

1.3.3 Stress models

It is well documented that stress influences the aetiology and maintenance of different kinds of health problems in the adult population (Eckenrode, 1984; Pearlin, Menaghan, Lieberman, & Mullan, 1981), as well as in the younger population (Compas, 1987; Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001). Knowledge of the ways in which children and adolescents respond to stress is important in understanding normative development and health, as well as in understanding the development of psychopathology and physical illness (Compas et al., 2001).

Most contemporary theories of stress are transactional in nature (Steptoe, 1991), suggesting that the conditions that give rise to stress responses involve encounters in which there is an imbalance between stimuli and psychosocial resources (Lazarus & Folkman, 1984). The intensity of the psychobiological stress response is from this point of view influenced both by factors connected to the psychosocial demands (stimuli) and the psychological resources of the individual. In terms of psychosocial demands, significant factors include the intensity, chronicity, and complexity of the stimulation (Patterson & Neufeld, 1987), as well as its novelty, predictability, and potential controllability (Steptoe, 1989). A useful distinction

between different types of stressors has been suggested by Wheaton (1999). He defines *stressors* as *conditions of threat, demands, or structural constraints that, by their very occurrence or existence, call into question the operating integrity of the organism.* He describes different types of stressors along a continuum from the most discrete to the most continuous. On the discrete side, there are sudden traumas and life change events, and, on the more continuous side, daily hassles, non-events, and chronic stressors. Another useful distinction is made between micro stressors and macro stressors, where the macro stressors occur at the macrosocial system level, or at least at a level of social system above the individual and the interpersonal micro level (Wheaton, 1999). In line with this typology of stressors, various types of stressors at different levels may influence the prevalence and existence of subjective health complaints among adolescents.

When it comes to the individual's psychological resources, prior experience with threatening situations (Dienstbier, 1989), personal qualities like negative affectivity (Watson & Pennebaker, 1989), and external factors like social networks and social support (Torsheim et al., 2004) have been suggested as important factors. Ursin and Eriksen (2004), based on their Cognitive Activation Theory of Stress (CATS), argue that in particular sustained high levels of arousal are important when it comes to the development of subjective health complaints. According to this theory, hopelessness and helplessness may, as a result of a cognitive evaluation of the outcome of events and available strategies, produce sustained arousal, which again may produce pathology.

1.3.4 The nature of subjective health complaints

As mentioned earlier, the co-occurrence of symptoms may be reflections of specific underlying dimensions in subjective health complaints. The identification of sub-dimensions

in subjective health complaints is important, because different symptom dimensions may have different aetiologies and require different remedial actions (Robbins & Kirmayer, 1991). In line with this possibility, subjective health complaints are often presented in medical practice as symptoms of different syndromes like fibromyalgia, chronic fatigue, and irritable bowel syndrome (Ford, 1997). However, one may question whether these are all manifestations of one and the same syndrome, which appears under different labels, different attributions, and different organisations (Eriksen & Ursin, 2002), and that the syndromes found in clinical populations may all be manifestations of a more general dimension of complaints. Theoretically, neuronal sensitization has been suggested as the neurobiological substrate for intolerable subjective complaints (Ursin, 1997), giving some theoretical support to the existence of one unitary dimension underlying the prevalence of all subjective health complaints.

Existing studies have addressed the assumption of underlying dimensions of health complaints in adult clinical populations (Robbins & Kirmayer, 1991; Swartz, Blazer, Woodbury, George, & Landerman, 1987), general adult populations (Ursin, 1997), and younger populations (Haugland, Wold, Stevenson, Aaroe, & Woynarowska, 2001; Hurrelmann, Engel, Holler, & Nordlohne, 1988; Wisniewski, Naglieri, & Mulick, 1988). However, the different dimensional structures that have been identified vary in terms of specificity (Haugland et al., 2001). Not very surprisingly, more specific dimensions, confirming clinical diagnoses (Robbins & Kirmayer, 1991; Swartz et al., 1987), are typically found in clinical populations compared with more general dimensions suggested by studies in general populations (Liu et al., 1997; Moum, 1991; Simon et al., 1996).

The existing research on the dimensionality of complaints in the adolescent population is also inconsistent when it comes to the suggested number of dimensions and their content. Haugland and Wold (2001) studied the underlying structure of eight health complaints in a cross national sample of adolescents, and found evidence of a two-factor solution with a somatic and a psychological factor. In a study including 18 health complaints Hurrelman et al. (1988), in addition to a psychological (vegetative) dimension, suggest two specific somatic dimensions labelled "physiological" (e.g., headache, gastric disorder) and "area specific complaints" (e.g., back ache, chest pains). Finally, Wisniewski at al. (1988), in a study of 17 complaints in a sample of adolescents (aged 11-14), show that 70% of the total variance in complaints was accounted for by one factor of complaints. In line with this finding of one general dimension of complaints, psychological and somatic dimensions of complaints have been found to be highly correlated (Haugland et al., 2001). Comparison and interpretation of the results in existing research are complicated by differences in measurement, definition of health problems, differences between clinical and non-clinical populations, as well as variations in methodological approaches to the study of dimensionality. In the present thesis, a possible underlying dimensionality of a "somatic" and a "psychological" dimension in subjective health complaints is studied using confirmatory factor analysis. Furthermore, the consistency of the identified underlying dimensional structure is examined across gender and age in a national representative sample of Norwegian adolescents.

1.3.5 Subjective health complaints across gender and age

Adolescence is a period characterised by great bodily, psychological, and psychosocial changes, and in particular early adolescence is assumed to be a time of disruption and transition (Larson, Moneta, Richards, & Wilson, 2002). From a stress perspective, there may

be significant changes in the types of stress experienced in adolescence as compared with childhood (Compas, Orosan, & Grant, 1993). Furthermore, developmental changes and transitions may affect the resources that are available for coping with stress and the types of coping strategies that are socially sanctioned, and they may alter the effects of the same coping response emitted at different points of development (Compas et al., 2001). Consequently, an increased level of psychosocial stress in adolescence may be assumed to influence the development of complaints.

According to the traditional biomedical perspective, a one-to-one causal relationship, or at least a close correspondence between biological state and symptom, is assumed. However, in the last decade, psychological research on symptom perception has discarded this assumption (Cioffi, 1991; Pennebaker, 1982), arguing that the actual physiological changes in themselves are insufficient in order to explain the symptom experience. In addition to the biological state, psychological and environmental factors are alleged to play a significant role in the development of symptoms (Pennebaker, 1982). In line with this view, a symptom can be defined as *an aversively perceived internal state (Van Wijk & Kolk, 1997).* A central assumption embedded in this definition is that a symptom is the outcome of a cognitive-perceptual process, rather than just a "simple" reflection of illness or disease.

Attentiveness to one's body and introspection are believed to be part of normal development during adolescence (Aro, Paronen, & Aro, 1987), and it has been shown that self-awareness and introspection are fundamentally related to inner distress and greater symptom reporting (McGrath, 1994). Both somatic- and psychological complaints may therefore increase during adolescence. In line with this hypothesis, several studies have shown that the prevalence of complaints increases during early adolescence and the beginning of mid adolescence (Aro et

al., 1987; Hakala, Rimpela, Salminen, Virtanen, & Rimpela, 2002; Perquin et al., 2000; Torsheim et al., 2004), and reaches a peak during mid-adolescence (Aro et al., 1987; Rauste-von Wright & von Wright, 1981).

However, while the existing research consistently finds an increase in the level of complaints among girls in this period, it is less conclusive on whether a similar increase takes place among boys in the corresponding period (Eminson, Benjamin, Shortall, Woods, & Faragher, 1996; Torsheim et al., 2004), suggesting that there may be different developmental patterns existing for girls and boys. The finding of an emerging gender difference during early and mid adolescence in several studies gives additional support to the assumption of difference in the developmental pattern of complaints between the genders. While there is evidence of an almost equal prevalence of subjective health complaints across gender before adolescence, a change towards a female predominance in symptom-reporting is found during adolescence (Marschall, 1989; Perquin et al., 2000; Rauste-von Wright & von Wright, 1981).

One possible explanation for different developmental patterns is that the changes in types of stress experienced during adolescence may be different for boys and girls (Compas et al., 1993), and that boys and girls are actually experiencing different levels of stress in this period of life. It has also been argued by Noack and Kracke (1997) that girls are psychologically and physically more likely to report health complaints, which may lead to higher levels of complaint among girls than boys in the face of challenges that increase in prevalence from early to middle adolescence. Finally, the reporting of complaints is likely to be influenced by societal and individual expectations (McGrath, 1994). From this point of view, girls may, to a greater extent, consider that it is more socially accepted to report complaints, and it is also

likely that the increased differences in perceived acceptance of reporting complaints increases with age.

Interestingly, it is a well-established finding in health-related research that females tend to report higher levels of complaints than males do in the adult population (Eriksen, Svendsrod, Ursin, & Ursin, 1998; Van Wijk & Kolk, 1997). This finding may indicate that a possible gender difference, emerging during adolescence, persists into adulthood. Knowledge about the developmental trajectories of complaints in adolescence among boys and girls is therefore of great importance. In the present thesis, the prevalence of subjective health complaints across gender and from early adolescence into early adulthood is examined using both cross-sectional and longitudinal data, giving valuable information about developmental trends throughout the whole period of adolescence.

1.3.6 Relative stability in subjective health complaints

Individual characteristics, such as personal resources for coping with stress, and the manner in which individuals actually cope with stress, may also be important factors influencing patterns of positive growth and development as opposed to the onset of psychological and somatic problems (Compas, 1987). It has been argued that an underlying personality trait, negative affectivity (NA), may influence the reporting of somatic and psychological complaints (Costa & McCrae, 1985; Watson & Pennebaker, 1989). Individuals with high NA are more likely to experience significant levels of distress and dissatisfaction over time and in any particular situation, even in the absence of overt stress. High NA individuals tend to be more introspective, to dwell more on their failures and shortcomings, and to focus on the negative side of others and the world in general (Pennebaker & Watson, 1991). Because negative affectivity is highly stable, it is likely that it may be associated with a high level of

stability in symptom reporting. Consequently, individuals experiencing high levels of complaints are more likely to also report higher levels of complaints later in life. This result is to some extent supported by some existing studies showing low- and medium-ranged stability coefficients in early adolescence (Verhulst & van Wattum, 1993; Wångby, 2000), and medium to medium-high stability coefficients in middle and late adolescence (Aro et al., 1987; Rauste-von Wright & von Wright, 1981; Verhulst & van Wattum, 1993; Wångby, 2000).

From a genetic point of view, a substantial continuity of complaints may also reflect a "switching on" of genetic factors (Rutter, 1991). The triggering of genetic factors related to the experience of subjective health complaints may, in line with the existing research, suggest that there will be a higher stability after these genetic factors have been triggered. In the present thesis, the relative stability of complaints is studied from early adolescence into early adulthood, providing important information about the stability and changeability of subjective health complaints throughout the adolescent period.

1.3.7 Interpersonal relationships and health

As mentioned earlier, besides individual physiological and psychological changes, adolescence is also a period characterised by social alterations. During adolescence, there is a shift in the focus of influence from family to peers (Mechanic, 1983), and relationships outside of the family become more and more important. During the past 20 years, a large amount of research has examined possible links between interpersonal relationships and health. Consequently, today consensus among researchers exists that both the quantity and quality of social relationships are related to morbidity and mortality (Berkman & Glass, 2000; Uchino, Cacioppo, & KiecoltGlaser, 1996). However, when it comes to the underlying

mechanisms linking social relationships and health, many questions are still unsolved (Cohen, 2004).

One important distinction is made between the characteristics of the social environment assumed to be beneficial for health, and, on the other side, the characteristics assumed to be destructive for health. I first turn to the "positive side" of interpersonal relationships. Cohen (2004) suggests that two social constructs are of special relevance when it comes to health promoting characteristics of the social environment, namely *social support* and *social integration*. The first construct, social support, is usually regarded as a coping resource (Cause et al., 1994; Compas, 1987; Torsheim et al., 2004) and is believed to influence health through the mechanism of "stress buffering." In other words, social connections benefit health by providing the psychological and material resources necessary to cope with stress. The stress-buffering model predicts that social support is beneficial for those suffering adversely, but that it does not play a role for those without highly stressful demands (Cohen, 2004). Statistically, the stress-buffering model is supported by the finding of an interaction of stress and social support.

In contrast, the mechanism underlying the positive influence of social integration on health is often assumed to be independent of stress. Social integration can be defined as *participation in a broad range of social relationships* (Brissette, Cohen, & Seeman, 2000). Along these lines, it has been suggested that humans have a basic need to belong, a need to form and maintain at least a minimum quantity of interpersonal relationships (Baumeister & Leary, 1995). The influence of social integration on health may therefore be regarded as a main effect, connected to the fulfilment of such a human need to belong. Furthermore, a generalised beneficial effect of social support could also occur because large social networks

provide persons with regular positive experiences and a set of stable, socially rewarded roles in the community (Cohen & Wills, 1985).

However, as mentioned above, recently there has been an increasing interest in possible negative aspects of interpersonal relationships on health (Bancila, Mittelmark, & Hetland, in press; Cohen, 2004; Mittelmark, Aaro, Henriksen, Siqveland, & Torsheim, 2004; Rudolph, 2002), also labelled the "negative side" of interpersonal relationships. In adolescence, it has for example been suggested that interpersonal stress (Rudolph, 2002) and being a victim of bullying (Fekkes, Pijpers, & Verloove-Vanhorick, 2004; Forero et al., 1999; Kaltiala-Heino, Rimpela, Rantanen, & Rimpela, 2000) are related to increased levels of different kinds of internalising symptoms. From a social integrative point of view, these psychosocial stressors may be regarded as representing the opposite of being socially integrated.

1.3.8 Psychosocial predictors in the school context

In the present thesis both the positive and the negative sides of interpersonal relationships are addressed within the school context. On the negative side, being a victim of bullying may be regarded as a potential psychosocial stressor existing in the adolescent's social environment, and, as stated earlier, bullying is considered to be a appreciable problem in the school context (O'Moore & Hillery, 1989; Solberg & Olweus, 2003; Whitney & Smith, 1993). In line with the definition of the phenomenon, being bullied may be regarded as a socially continuous or chronic type of stressor affecting the individual over time. However, on the other hand, when the attacks are severe, it may also be viewed as a discrete and more traumatic type of stressor. Furthermore, in line with the concept of social integration mentioned earlier, being a victim of bullying may also be regarded as a persisting threat against the human basic need to belong, which may again have consequences for health and wellbeing.

Recently, there has been an increasing focus on possible effects of being a victim of bullying on different health outcomes in early adolescence (Forero et al., 1999; Kaltiala-Heino et al., 2000; Nansel et al., 2001; Rigby & Slee, 1999), and the existing research indicates that there is a relationship between being a victim of bullying and different health outcomes. However, a clear limitation within most existing studies in the field is that they are based on cross-sectional data, which only provides information about the existing associations between bullying and these outcomes, and not clues regarding the causal direction of the relationship (Hawker & Boulton, 2001).

On the positive side of interpersonal relationships, students and teachers may serve as important resources in the school context, and may have both direct and indirect effects on health and well being (Cohen, 2004). Furthermore, teachers and peers might prove important resources to help stop victimization (Rodkin & Hodges, 2003). Peers provide the primary context within which bullying occurs and can directly or indirectly support its continuance (Greene, 2003; Hazler & Denham, 2002; Rodkin & Hodges, 2003). Teachers can provide contexts in which bullying is tacitly tolerated or successfully curtailed (Greene, 2003; Rodkin & Hodges, 2003). The present thesis addresses the relationship between being bullied, social support, and subjective health complaints using longitudinal data. The use of longitudinal data has the potential to provide important insights about the relationship between developmental aspects of the phenomenon of being bullied and subjective health complaints. Furthermore, the relationship between social support from students and teachers and these developmental processes are addressed.

1.4 Overall aims of thesis

1. To study possible underlying sub-dimensions of subjective health complaints in a adolescent population
2. To examine if different developmental patterns in subjective health complaints exist across gender and age throughout adolescence and into early adulthood
3. To examine the relative stability in subjective health complaints throughout adolescence and into early adulthood
4. To examine the reciprocal relationship between being bullied and the development of subjective health complaints from early to mid adolescence.
5. To study possible direct effects of support from students and teachers on the experience of being bullied and the development of subjective health complaints

2. MATERIAL AND METHODS

2.1 Design and samples

In order to address the research questions described above, data from three different studies were applied. The three studies and samples are presented below.

2.1.1 Health Behaviour in School-aged Children study (paper I)

The Health Behaviour in School-aged Children study (HBSC) is a cross-national and social epidemiological study. The overall goal of the study is to increase the understanding of lifestyles and health behaviour and their context in the lives of young people. Questionnaire surveys are conducted in participating countries among schoolchildren aged 11, 13, and 15

years in accordance with a standardised protocol (Currie, 1998). The first survey was conducted in 1983/1984 in Finland, Norway, England (United Kingdom), and Austria, and, since 1985, surveys have been carried out at four-year intervals in a growing number of countries. In 1994, 1997, and 2001 additional surveys were conducted on a national representative sample of students from Norwegian comprehensive schools, aged 16. The present thesis uses data from 1997/1998 from the Norwegian part of the survey.

Table 1. Sample description of the Health Behaviour in School aged Children study.

	Primary school	Secondary School		Comprehensive school	
	Grade 6	Grade 8	Grade 10	Grade 1	Total
Population	53.626	51.186	52.346	65.498	222.656
Selected classes	138	105	105	153	501
Non-responding classes	24	17	19	16	76
Participating classes	114	88	86	137	425
Original sample	2.303	2.144	2.165	2.520	9.132
Students in participating classes	1.925	1.828	1.870	2.260	7.883
Student non-response in participating classes	192	205	200	227	824
Final sample	1.733	1.623	1.670	2.033	7.059
Response rate	75.2%	75.7%	77.1%	80.7%	77.3%

In accordance with the standardised protocol, the Norwegian 1997/1998 sample was drawn by systematic cluster sampling (Currie, 1998). A list of all school classes in Grades 6, 8, and 10 was provided from the Norwegian Ministry of Education. From this list, a systematic equal probability sample of 138 classes in Grade 6, 105 classes in Grade 8, and 105 classes in Grade 10, with 2303, 2144 and 2165 pupils respectively were selected (Table 1). Using the same procedure, a sample of 2520 Grade 1 students in 153 classes was selected from a list of all comprehensive schools in Norway. The main reason for non-participation was absenteeism on the day the survey was conducted. In paper one the total sample of 7059 students is used.

2.1.2 Health Promoting Schools study (paper I, III)

The Health Promoting Schools study is the Norwegian part of the European Network of Health Promoting Schools (ENHPS) study. The main goal of this initiative was to attain good health and lifestyle by the development of a health promoting school environment (Wold & Samdal, 1999). All schools in Norway were invited to formulate an application for participation in the Norwegian network of health promoting schools. Based on these applications, 10 schools were selected to participate, including three primary schools, five secondary schools, and two mixed primary and secondary schools. As part of the project, surveys among the students in the schools were performed twice a year in the period from May 1994 to December 1998. Data were collected through anonymous, self -completion questionnaires administered to the students who were present by a teacher during an ordinary class-hour. The questionnaire included items on health behaviours, subjective health, and the social environment in the school. The main reasons for non-participation were parental non-consent and absenteeism on the day the surveys were conducted. Two sub-samples from the

study are used in the present thesis, including one cross-sectional sample and one cohort sample.

In paper I, a cross-sectional sample consisting of 1601 Norwegian students in Grades 5 to 10 (11 -15 year olds) from the study was used. From the full study sample, 1427 students participated in the study, giving an overall response rate of 89%. The data collection was carried out at the end of November and the beginning of December 1994.

In paper III a cohort of 386 students in Grade 8 (aged 13) from the full study sample (autumn 1994) was used. Three follow-up studies were conducted at 6-month intervals in spring 1995, autumn 1995, and spring 1996. Students who did not participate at baseline and those who reported on less than two of the following occasions were excluded from subsequent analysis.

2.1.3 The Norwegian Longitudinal Health Behaviour (NLHB) Study (paper II)

The NLHB-study is a 10-year prospective cohort study of self reported health, health behaviour, and lifestyle patterns among Norwegian adolescents in Hordaland County. The informants were followed from the age of 13 to the age of 23. Inclusion in the study was based on informed consent from both participants and their parents/guardians. The study is two generational, as parents/guardians were asked to participate at three (1990, 1993, and 1996) of eight data collections. Data from parents/guardians are not used in the present thesis.

In the baseline measurement performed in 1990, 22 of 130 urban and rural schools in Hordaland County were randomly selected to participate in the study. From these schools, 1195 students and their parents/guardians were invited to participate in the study. Participants' mean age at baseline was 13.3 years (SD = 0.3). Students who did not wish to

participate (n= 46; 3.8%), whose parents did not give their consent (n = 222; 18.6%), or who gave incomplete answers (n = 3; 0.3%) were not included in the study. The final sample consisted of 924 students, giving a response rate of 77% of the original baseline sample. The present thesis draws on data from seven (1990, 1991, 1992, 1993, 1996, 1998, and 2000) of the eight measurements. The number of participants by measurement occasion is presented in Table 2. Participants who responded with respect to the variables relevant to this paper on fewer than two of the occasions were excluded. After this procedure, the data set consisted of 891 participants, of which 469 were boys and 422 were girls.

Table 2. Number of participants in the NLHB study by measurement occasion

	1990	1991	1992	1993	1995	1996	1998	2000
Age	13	14	15	16	18	19	21	23
N	924	958	963	789	779	643	634	627

2.2 Measurement

A full overview of the scales and items used in the three papers is presented in Appendix I, Table 3.

2.2.1 Subjective health complaints

In the present thesis, subjective health complaints were measured by two extended versions of the HBSC symptom checklist (Currie, 1998) and the NLHB symptom checklist. An 11-item (extended version a) and a 15-item version (extended version b) of the HBSC symptom checklist were used in paper I. The original checklist contained eight symptoms including headache, stomach-ache, back ache, sleeping difficulties, dizziness, feeling low, nervousness,

and irritability. The 11-item version used in the Norwegian 1997/1998 HBSC survey included fatigue, upper back pain, and anxiety in addition to the original items, while, in the 15-item version used in the Health Promoting Schools study, the checklist was extended by also including nausea, pain in arms and legs, palpitations, and body ache in addition to the 11 items. The respondents reported the frequency of the symptoms on a five-point scale ranging from "daily" to "seldom or never" with reference to the last six months. Tests of internal consistency reveal adequate alphas for both versions of HBSC symptom checklist: .77 and .86, for the 11-item and 15-item versions, respectively.

The NLHB symptom checklist contains 10 symptoms (headache, stomachache, back pain, pain in arms and legs, dizziness, nausea, poor appetite, colds or sore throat, fatigue and diarrhoea). The respondents reported the frequency of the symptoms the previous three months on a three-point scale with the categories ‘very often’, ‘some of the time’, and ‘seldom or never’. Based on a preliminary reliability and exploratory factor-analysis as described in paper III, three items ('colds or bad throat’, ‘pain in the arms and legs’, and ‘diarrhoea’) were not used. For the remaining seven items, the following alphas were found: .75, .74, .72, .70, .72, .67 and .72, respectively, in 1990, 1991, 1992, 1993, 1996, 1998, and 2000.

Analyses of systematic attrition in the measurements of complaints within the two cohorts used in the present thesis have been performed. In the NLHB cohort the analyses revealed a small, but borderline significant difference in the mean level of complaints between responders and those who did not respond on subsequent measurements after the measurement in 1992. Examination of the mean levels reveals that non-responders on later occasions have a moderately higher level of complaints at the 1992 measurement than those

remaining in the study at later occasions. However, except from this finding, no significant differences were found between responders and non-responders at later occasions within the two cohorts, and systematic attrition is therefore not likely to substantially affect the results of this thesis.

In a comprehensive validation study of items included in the HBSC and the NLHB symptom checklists, Haugland and Wold (2001) concluded that adolescents were able to understand, evaluate, and report subjective health complaints. They also found that the items in symptom checklists, with only a few exceptions, had adequate face validity. Furthermore, the items in the checklists showed good test-retest reliability.

2.2.2 Victim of being bullied

Being a victim of bullying was measured by two questions from the Olweus Bully/Victim Questionnaire (1986), addressing direct and indirect bullying. The questions were preceded by the following explanation: "The next questions are about bullying. We say a pupil is being bullied when another pupil, or a group of pupils, says or does nasty and unpleasant things to him or her. It is also bullying when a student is hit, kicked, threatened, and shut in a room by others or something similar. This may take place often, and it is difficult for the student that is bullied to defend him- or herself. It is also bullying when a pupil is teased repeatedly in a way he or she doesn't like. But it is not bullying when two pupils of about the same strength quarrel or fight." In the first question, addressing direct bullying, the students were asked how often they had been bullied in school during the ongoing term. In the second question, addressing indirect bullying, the students were asked how often other students did not want to spend time with them at school and they ended up being alone. The respondents reported using the following response categories: "I haven't… (question 2: it hasn't happened…) (1),"

"once or twice" (2), "sometimes" (3), "about once a week" (4), and "several times a week" (5). Internal consistency analysis for the two items at the baseline measurement yielded an acceptable Cronbach's alpha of .69. The questions in the Olweus Bully/Victim questionnaire have been developed and evaluated over the past two decades with careful determination of validity and reliability (Olweus, 1994).

2.2.3 Teacher and Student support

To measure student and teacher support, an extended version of The Teacher and Classmate Support Scale (Torsheim et al., 2000) was used. In the original version, support from teacher(s) was measured by the following four items: "I'm encouraged to express my own views in my class," "Our teachers treat us fairly," "When I need extra help, I can get it," and "My teachers are interested in me as a person." The version used in the present study was extended with the following item: "Most of my teachers are kind and helpful." The respondents reported using the response keys: "strongly disagree" (1), "disagree" (2), "neither agree nor disagree" (3), "agree" (4), and "strongly agree" (5).

Student support was in line with the original version of the Teacher and Classmate Support Scale and was measured by the following four items: "The students in my class enjoy being together," "Most of the students in my class are kind and helpful," "Other students accept me as I am," and "When a student in my class is feeling down, someone else in class tries to help." The respondents reported with the following response keys: "never" (1), "rarely" (2), "sometimes" (3), "often" (4), and "always" (5). At baseline, analyses of the internal consistency of The Teacher and Classmate Support Scale yielded Cronbach's alphas of .79 and .74, respectively. The original version has shown good test-retest reliability, and the overall validity of the support scales indicates that they are adequate measures of a domain-specific kind of support (Torsheim et al., 2000).

2.3 Data analysis

2.3.1 Structural Equation Modeling (SEM)

The majority of the data analyses in the present thesis is performed by structural equation modeling (SEM). During the last decades SEM has become one of the most popular and powerful tools for analysis of data in the behavioural sciences (DeShon, 1998), and is known to have several general advantages over more traditional analyses like correlations, analysis of variance, and multiple regression. A common problem within psychological research is the fact that the observed correlation between any two variables is attenuated when either variable is measured with error. One often illuminated advantage of SEM is the possibility to correct for measurement error and therefore provide estimates of latent variables that are not biased due to unreliability in the observed indicators. It is, however, important to notice that this advantage does not imply that SEM is capable of providing estimates of the relation between latent variables that correct for all sources of measurement error (DeShon, 1998). Another advantage of SEM is the possibility to simultaneously estimate a measurement model, specifying relations between measured variables, and specify structural relations among latent variables. Furthermore, SEM is highly flexible and may be used on cross-sectional, longitudinal, and multi-group data. Finally, it also provides an estimation of the overall fit between the model tested and variable covariances within the data.

2.3.2 Assessing model fit

There are many different model fit indexes described in the SEM literature, and new indexes are being suggested all the time. In the present thesis only a few of these indexes have been applied and a short description of these is given below.

- *Model likelihood Chi-square*: The most basic fit statistic is the model likelihood Chi-square. The value for a just identified model generally equals zero and has no degree of freedom. If $\chi^2_M = 0$, the model perfectly fits the data. As the value of χ^2_M increases, the fit of an overidentified model becomes increasingly worse (Kline, 2005). Chi-square is not considered to be a good measure for the overall fit, because of its sensitivity to the correlation size and sample size (Kline, 2005). However, the chi-square is the basis for most other fit indexes, and is very useful in comparisons of nested models.
- *Comparative Fit Index (CFI):* The CFI (Bentler, 1990) is one of the most widely used measures within the class of comparative or incremental fit indexes. The CFI has been shown to behave adequately in both large and small samples. The CFI ranges from 0 to 1, with 1 reflecting a perfect model. Originally a CFI over .90 was considered to be representative of a well fitting model; however, a revised cut-off value close to .95 has recently been advised (Bentler & Yuan, 1999).
- *Root Mean Square of Approximation (RMSEA):* During the last decade, the RMSEA (Browne & Cudeck, 1993) has been increasingly applied as an indicator of fit. The RMSEA is based on the realistic assumption that most models are only approximately true in the population. A value of RMSEA less than 0.05 indicates a good fit, while values as high as 0.08 represent reasonable errors of approximation in the population (Browne & Cudeck, 1993).
- *Akaike's information criterion (AIC):* The AIC (Akaike, 1987) and other predictive fit indexes are generally used in SEM to select among competing nonhierarchal (non-nested) models (Kline, 2005). The AIC corrects for model complexity by taking into account the degree of freedom of the model under interest, thus allowing for

comparison of very different models. The model with the smallest AIC is chosen as the one most likely to replicate.

2.3.3 Confirmatory factor analysis (CFA)

Statistically and conceptually, it is important to make a distinction between exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). A basic assumption within both types of factor analysis is that the covariances between a set of observed variables can be explained by a smaller number of underlying factors. The main distinction between EFA and CFA is that in the latter there is a clear hypothesis about the number of factors and the relations between the latent factor(s) and the observed factors, while in EFA the underlying structure is literally identified by the analysis it self. In CFA the hypothesized model is therefore imposed on data, in order to obtain estimates of the parameters in the model (e.g., factor loadings, variances, and covariances between factors), as well as to assess the overall fit of the model. CFA is applied in paper one addressing possible underlying dimensions of subjective health complaints. Furthermore, variations in the dimensional structure suggested by CFA are examined across gender and age by the use of latent mean analysis. In paper two a trait-state analysis (LST) is applied which may be regarded as a complex and expanded CFA. A short description of LST analysis and theory is given below.

2.3.4 Latent state-trait (LST) analysis

Latent state-trait analysis (Schmitt & Steyer, 1993) is regarded as an appropriate model for the analysis of stability of a single structure across two or more occasions. LST models take into account that the measurement of an attribute is affected by a stable person component (trait) but also by a systematic though unstable situational component (Schermelleh-Engel,

Keith, Moosbrugger, & Hodapp, 2004). The underlying idea with LST theory is to decompose an observed variable measured at several occasions by the use of CFA into a latent state variable and measurement error and further decompose the latent state variable into a latent trait variable and a latent state residual. According to LST theory, the latent trait variable reflects the person component of the measurement, in other words, the interindividual differences that are stable across times of measurement. On the contrary, the latent state residual reflects the situational and interactional component of the measurement across occasions. Finally, the measurement error in the LST model reflects non-systematic and unstable measurement error. In addition to the components described above, the LST model allows for systematic general and systematic person-specific effects due to methods or the measurement instruments used, and these effects are represented by a separate latent method variable in the LTS model. The separate components of variance are estimated by the use of following formula: $Var(y_{ij}) = \lambda_{ij}^2 \gamma_j^2 Var(\xi) + \lambda_{ij}^2(\varsigma_j) + \kappa_{ij}^2 Var(\xi_j) + Var(\varepsilon_{ij})$

In the formula the total variance $(Var(y_{ij}))$ is decomposed into a trait $(\lambda_{ij}^2 \gamma_j^2 Var(\xi))$, state $(\lambda_{ij}^2(\varsigma_j))$, method $(\kappa_{ij}^2 Var(\xi_j))$ and error $(Var(\varepsilon_{ij}))$ component.

In article two the LST model is applied in order to examine relative stability and possible change in the measurement of subjective health complaints across five occasions from early adolescence into early adulthood.

2.3.5 Analysis of individual growth curves (IGC)

In paper two and three analyses of longitudinal data were conducted by the means of analysis of individual growth curves (IGC). In estimating growth curves, an individual growth model is chosen to represent the change that each person experiences with time (Willett & Sayer,

1994). At a statistical level, two approaches have been developed for estimating parameters of such models: SEM and multilevel modeling. In the present thesis, both approaches have been applied by the use of MLwiN 1.10 for multilevel modeling and AMOS 5.0 for SEM models.

2.3.6 Autoregressive Latent Trajectory (ALT) model approach

To study the reciprocal relationship between being bullied and subjective health complaints, an Autoregressive Latent Trajectory (ALT) model approach was undertaken in paper three. The ALT model is a synthesis of two broadly applied strategies for analyzing panel data, usually referred to as autoregressive models and latent trajectory models (Bollen & Curran, 2004). Traditionally, researchers have viewed the two strategies as two independent ways of analysing longitudinal data (Bollen & Curran, 2004), and some researchers even see them as competing strategies (Bast & Reitsma, 1997; Rogosa & Willett, 1985). In contrast to this perspective, within the ALT model, autoregressive models and latent trajectory models are regarded as complementary. An advantage of the ALT model approach is therefore that both time-specific and random growth components can be estimated simultaneously (Bollen & Curran, 2004) in contrast to more traditional autoregressive and latent trajectory models.

2.4 Generalisability and ethical considerations

2.4.1 Generalisability

The measurements used in the present thesis are well established and have been thoroughly tested in terms of validity and reliability. Consequently, problems due to validity and reliability are not likely to affect the generalisability of the results in the thesis substantially.

Another important question concerning the generalisability of the results is the extent to which the three studies are representative of the adolescent population in Norway. The international HBSC study regulations for sample size and procedures for drawing the sample are developed in order to assure that the samples are nationally representative (Currie, 1998). Thus, it is possible to generalise the findings from this study to the Norwegian population in early and mid adolescence. In paper one and three, sub-samples from the ENHPS study are applied. As mentioned earlier, in this study, all schools in Norway were invited to formulate an application for participation in the Norwegian network, and 10 of the applying schools were selected based on these applications. Consequently, the sample can neither be regarded as nationally representative nor randomly selected, and this procedure questions the generalisability of these data. However, the results from the ENHPS study have been shown to be consistent with the findings from the national representative data from the HBSC study (Wold, Taklo, Aasen, & Samdal, 1996), which indicates that the study to some extent is representative of the adolescent population in Norway. For the NLHB sample used in article two, a randomised selection among all schools in Hordaland County was performed. The sample may therefore be regarded as representative for the students in schools in this county, and it is also a reasonable assumption that the students in Hordaland do not differ to a large degree from adolescents in other counties in Norway.

A final threat against the generalisability of the results in the present thesis is the danger of systematic attrition in the two cohort studies. Several efforts were made in order to reduce attrition within the NHLB study after the baseline measurement in 1990. To motivate students to continue participation, newsletters providing information on the results from the study were sent to all participants as often as four times a year. Furthermore, from the fourth (1995) and succeeding follow-ups, small gifts (T-shirts, CD's, and lottery tickets) were

provided to those participants who returned the questionnaire. Despite these efforts being made, the number of respondents declined slightly over the year as a shift from school-based surveys to postal surveys was required.

However, a series of analyses in which responders and non-responders were compared do not indicate that attrition is a substantial problem for any of the study variables in the two cohorts from the ENHPS and NLHB studies relevant for the present thesis. Furthermore, in the analysis of longitudinal data using AMOS (4.01 and 5.0) a full-information maximum likelihood (FIML) based imputation is applied to replace missing data. The FIML imputes missing values by estimating a likelihood function for each individual based on the variables present in the model. Maximum likelihood based methods, like FIML, have been shown to produce unbiased parameter estimates and standard errors, when data are missing at random (Roth, 1994; Wothke, 2000), and it is therefore possible to a larger degree to retain responders with missing data in the analysis.

In conclusion, only the sample from the HBSC study can be said to be representative for the Norwegian adolescent population. For the two cohort studies, some caution is therefore required when generalising the findings to the total population of adolescents in Norway.

2.4.2 Ethical considerations

Participation in the three studies used in the present thesis was voluntary, and written information was given to the students, parents, and teachers prior to the surveys. For the two longitudinal studies (ENHPS and NLHB), a written consent from the parents of the students was collected, and legal permissions to store the longitudinal data sets were given by the Data

Inspectorate of Norway. The HBSC study was approved by the Data Inspectorate of Norway based on the use of informed and passive consent.

3. RESULTS

3.1 Paper I: "Subjective health complaints in adolescence: Dimensional structure and variation across gender and age"

The aim of this study was to investigate dimensional structures in subjective health complaints in adolescents and to examine their variation across gender and age groups.

Data from two studies were used. 1) A study based on a convenience sample, consisting of 1427 Norwegian students (11 -15 year olds) from schools participating in the European Network of Health Promoting Schools. 2) A nation wide study amongst 7059 Norwegian students (aged 11, 13, 15, and 16) from the Health Behaviour in School-aged Children (HBSC) study. Subjective health complaints were measured by revised versions of the HBSC symptoms checklist (HBSC-SCL).

In study 1 confirmatory factor analysis revealed that a model of two highly correlated factors, which can be labelled somatic and psychological, fitted the data reasonably well (CFI = 0.91). This two-factor model was applied in study 2, and latent means were tested across sub-samples defined by gender and age. The results indicate that girls show higher mean levels of complaints compared to boys on both factors. There is also an indication of an increase in the mean level of these factors with age amongst girls, while amongst boys there is less, if any, difference across age groups. The correlation between the somatic and psychological factors was virtually constant across age groups and gender. The identification of a somatic and a psychological factor may indicate the existence of two different dimensions that can have

different aetiologies. The gender difference in latent means across age groups may suggest a different developmental pattern amongst girls and boys.

3.2 Paper II: "Stability and change in subjective health complaints from adolescence to early adulthood"

The aim of this study was to investigate normative change and relative stability of subjective health complaints from age 13 to 23. Longitudinal data from the Norwegian Longitudinal Health Behaviour (NLHB) study (n = 891) were used, and subjective health complaints were measured at seven different occasions using the NLHB-symptom checklist. Only small normative changes in the mean complaint level across age were found. However, growth curve analysis confirmed the emergence of a gender difference during early and mid-adolescence, where girls had higher levels of complaints than boys. A moderate increase in cross time correlation coefficients was found, and Latent State-Trait (LST) analysis indicated an increasing trait component in health complaints. By dividing the baseline sample into high, medium, and low complaint groups, substantial tracking of complaints across age was found. Different developmental pattern in complaints was revealed for boys and girls, and there was indication of a consolidation of complaints during adolescence into early adulthood.

3.3 Paper III:" Subjective health complaints and bullying in early adolescence: A longitudinal study"

This 2-year longitudinal study investigated the subjective health complaints, incidence of being bullied, and school support of Norwegian adolescents (aged 13 at the start of the study) based on data being a part of the Health Promoting Schools study (ENHPS). Data were

collected systematically from 386 students at 6-month intervals. The analysis employed univariate, bivariate, and conditional multivariate latent growth models with examination of autoregressions and cross lags. The analyses yielded three primary results. First, different growth models were suggested to be the most appropriate for two constructs of being bullied and subjective health complaints. The measurements of being bullied across the four time intervals was best explained by a one-factor latent curve model (intercept) implying that there was a stable component underlying the repeated measures of being bullied over time that is not changing as a function of time. In contrast, the measurements of subjective health complaints were best explained by a two-factor latent curve model (intercept and slope) implying that there is not only evidence for a meaningful starting point and a positive rate of change in the measurement of subjective health complaints, but also substantial variability in these growth factors. Second, the bullying intercept was associated with the subjective health complaints slope, indicating the possible causal influence of bullying on subjective health complaints. Finally, student support, but not teacher support, was significantly negatively related to being bullied, while there were significant direct effects from both support sources and initial levels of subjective health complaints.

4. DISCUSSION

In the discussion chapter, the main findings in the present thesis are first discussed separately, and secondly a more general discussion is given. Furthermore, strengths and limitations and implications for research and practice are discussed.

4.1 Discussion of main findings

The discussion of main findings follows the same order as the research questions from the three papers in the thesis. The discussion therefore first focuses on the possible underlying dimensions of subjective health complaints. Secondly, possible developmental patterns from adolescence to early adulthood and the relative stability of subjective health complaints are addressed. Finally, the reciprocal relationship between bullying and subjective health complaints and the role of social support are discussed.

4.1.1 One or two factors?

The results from the present thesis do not give a clear answer to the question about dimensionality in subjective health complaints in adolescence. In line with some of the earlier studies of dimensionality in complaints in adolescence (Haugland et al., 2001; Hopland, Aarø, & Wold, 1993), the results from paper one show evidence of two, rather general, and highly correlated, underlying dimensions of subjective health complaints. These dimensions may be labelled "somatic" and "psychological" complaints, and the factor structure is shown to be consistent across gender and age.

One possible interpretation of the high correlation between the somatic and psychological factors could be that they are sub-dimensions of a higher order factor of complaints. Another possible explanation is simply that there is only one general dimension underlying both somatic and psychological complaints. From a neurobiological point of view, neuronal sensitization (Ursin, 1997) may be the substrate underlying both the more psychological and the somatic complaints. However, the results in the present thesis can not rule out the possibility that the psychological and somatic factors are two distinct factors, and consequently also have different aetiologies. Along these lines, the dual-aetiology hypothesis

has recently been suggested as a possible explanation for dimensionality in co-occurrence of symptoms (Whitehead, Palsson, & Jones, 2002; Wilhelmsen, 2005). According to this theory, some individuals with complaints may have a predominantly psychological aetiology, whereas in others it has a predominantly biological aetiology.

Most studies have applied exploratory factor analysis (Graber & Brooks-Gunn, 1996; Hurrelmann et al., 1988) or confirmatory factor analysis (Haugland et al., 2001) in order to study possible underlying dimensions in complaints in adolescence. However, recently, a new and different approach has been applied. Instead of applying factor analysis, Hagquist and Andrich (2004) use a unidimensional Rasch model analysis, where the primary focus is on the operating characteristics of the items intended to measure a single construct of subjective health. By reducing the number of items according to this analysis, they show that "somatic" and "psychological" complaints might be considered to be one general dimension of subjective health complaints. However, one may argue that by doing the opposite of this approach, and expanding the number of complaints, it is possible to reveal a clearer underlying structure of somatic and psychological complaints. Furthermore, by "implying" unidimensionality to the measurements of subjective health complaints, there is a danger of losing information regarding the relationship between the complaints and potential predictors.

The unclear answer to the existence of one or two factors in subjective health complaints may necessitate a consideration of both a unidimensional and multidimensional approach, when studying subjective health complaints. Thus, both statistical aspects (e.g., statistical power), and current research questions should be taken into account when deciding what approach is the most appropriate.

4.1.2 The normative development of subjective health complaints

All three papers in the present thesis add to the existing knowledge about the development of subjective health complaints in the adolescent period. From an epidemiological point of view, major advantages of the present thesis are the length of the age span covered (aged 11-23) by the current studies, and that multiple kinds of health complaints are measured within these studies.

From a developmental perspective, adolescence is a time characterised by biological, psychosocial, and social changes that may be assumed to also influence the reporting of subjective health complaints. Despite a rather high absolute stability in subjective health complaints from early adolescence to early adulthood being detected in paper two, there is also evidence of some normative developmental changes in the level of complaints between early adolescence and early adulthood. In line with previous research, an increasing level of complaints is found from early to mid adolescence for girls (Aro et al., 1987; Perquin et al., 2000). However, the developmental pattern among boys found in the present thesis is more unclear. In paper one, there is some indication of a small increase in somatic complaints, but not in psychological complaints, among boys, while, in paper three, there is evidence of an increase in subjective health complaints for both boys and girls from early to mid adolescence. In contrast, in paper two, there is an indication of a small decrease of complaints for boys in the corresponding period. A similar inconsistency in the developmental pattern of complaints in boys is also found among other studies (Aro et al., 1987; Eminson et al., 1996; Rauste-von Wright & von Wright, 1981; Torsheim et al., 2004).

The inconsistencies between the three studies in the present thesis may have occurred due to differences in terms of study design, study period, and measurements of subjective health

complaints among the three studies. Noteworthy, the evidence of considerable absolute stability found in paper three may be influenced by the rather limited range of response categories in the NLHB-symptom checklist. Another potential source of bias may be systematic attrition within the cohorts in the longitudinal studies, where those experiencing or developing more complaints are non responders to a larger degree than others at later measurements. However, this potential bias is controlled for as far as possible in the present thesis, by testing for systematic attrition within the cohorts. Other than the finding of a moderately, but still borderline significant, higher level of complaints among non responders compared with responders at the 1992 measurement in the NLHB-study, no indication of systematic attrition was found for the measurements of subjective health complaints on the other occasions.

4.1.3 The emergence of a gender difference

As shown earlier in the discussion of normative development in subjective health complaints in adolescence, the results from paper one and two suggest that there may be a different developmental pattern among boys and girls respectively. Existing research on different types of internalising symptoms such as depressive mood (Holsen, Kraft, & Vitterso, 2000; Nolen-Hoeksema & Girgus, 1994; Wichstrom, 1999), and chronic pain (Perquin et al., 2000) suggests that a gender difference emerges during early and mid adolescence. In line with this finding, the results from the present thesis support the assumption that there is an emergence of a gender difference in the level of subjective health complaints as a consequence of the developmental changes that occur between early and mid adolescence. Furthermore, in line with previous research (Rauste-von Wright & von Wright, 1981), there is evidence of this gender difference remaining throughout the adolescent period and into early adulthood.

Different explanations exist for the development of internalising symptoms, and, from an ecological developmental perspective, these explanations may be at the biological, psychological, social, and cultural levels. Consequently, possible differences in developmental patterns between boys and girl suggest that these influences may, to some degree, act gender specifically. In line with this possibility, early puberty, for example, has been shown to be related to higher levels of subjective health complaints among girls but not among boys (Kaltiala-Heino, Marttunen, Rantanen, & Rimpela, 2003). At the psychological level, differences in the way boys and girls perceive symptoms have been used as an explanation (Van Wijk & Kolk, 1997). Van Wijk and Kolk (1997) suggest that the cognitive-perceptual model can be applied to explain the predominance of health complaints among females compared to males found from the onset of puberty and into adult life. Based on their model and existing research, these authors argue that gender differences can be attributed to: 1) excess of somatic information as a result of the female reproduction role, 2) the disadvantageous social position of women, associated with either a relative lack or excess of external information, 3) a female tendency to selectively attend to bodily cues, 4) a female preference for a somatic attribution style, 5) a stronger female disposition to somatise, or merely to 6) a greater willingness by females to report the symptoms they perceive to others. It has also been suggested that girls to a greater extent than boys tend to internalise their psychosocial problems (Brack, Brack, & Donald, 1994). Consequently, girls may be assumed to a larger degree than boys to develop subjective health complaints as a result of psychosocial challenges during adolescence.

On contextually "higher" levels, distribution of work and political power (Kawachi, Kennedy, Gupta, & Prothrow-Stith, 1999), gender inequality (Torsheim et al., 2006) and gender role socialisation (Mechanic, 1983) have been suggested as important factors to

explain female-male differences. Thus, from an ecological perspective, it is important to emphasise that these levels of influences act upon each other, and should not be viewed as being independent.

4.1.4 Do subjective health complaints consolidate during adolescence?

Although there is an indication of a high degree of absolute stability in subjective health complaints in the adolescent period, different developmental trajectories may exist at the individual level. In other words, some individuals may experience an increase, others a decrease, and some no change at all, while the mean level of the group may still remain almost the same. It is therefore important to study the degree to which individuals in a group hold their relative positions over time, and, more specifically, the relative stability of complaints. Previous longitudinal studies show considerable relative stability in subjective health complaints throughout adolescence (Mikkelsson et al., 1997; Moilanen, 1991; Verhulst & van Wattum, 1993), and the results from paper two in the present thesis support that adolescents to a rather large degree maintain their relative positions throughout adolescence and into early adulthood. These results are in line with the assumption that the reporting of somatic and psychological complaints may be influenced the underlying personality trait of Negative Affectivity (Watson & Pennebaker, 1989). Furthermore, in the latent state-trait (LST) analysis, a substantial trait component in subjective health complaints across gender and age is identified.

Interestingly, an increasing relative stability may indicate that there is a consolidation of a phenomenon, and that it is less likely to change across time. In the present thesis, there is some indication of a consolidation of subjective health complaints during adolescence and into early adulthood. This finding is also confirmed in the LST analysis, where there is

evidence of an increasing trait component in subjective health complaints from middle adolescence to late adolescence. These findings suggest that having higher levels of subjective health complaints in early adolescence increases the probability of having higher levels of complaints later in adolescence and into early adulthood, and that this pattern also becomes more persistent during adolescence. From a preventive point of view, these results may imply that it is important to identify individuals with already elevated levels of subjective health complaints early in adolescence in order to administer interventions at an early stage in the consolidation process.

4.1.5 What comes first - strain or pain?

Several studies have shown that there is a relationship between being bullied and increased levels of health complaints (Forero et al., 1999; Kaltiala-Heino et al., 2000; Nansel et al., 2001), and being bullied therefore may be regarded as a potential stressor in the daily life of adolescents. However, on the contrary, it may be argued that adolescents experiencing high levels of subjective health complaints are more likely to be bullied. Interestingly, it has been suggested that the developmental relationship between bullying and internalising symptoms can be characterised as a negative cycle (Craig, 1998; Wilkins-Shurmer et al., 2003). According to this hypothesis, adolescents showing internalising symptoms (e.g., anxiety) are more likely to be selected as victims of bullying, and that bullying again results in an increase of internalising symptoms.

As pointed out in the introduction section, most studies on the relationship between being bullied and different health outcomes have been performed on cross-sectional data giving few cues about the causal direction of the relationship between the two constructs. In the present thesis, the relationship between being bullied and subjective health complaints is addressed

using longitudinal data, which gives some additional cues about the causal relationship between being bullied and health complaints. In line with the existence of a normative developmental trend in subjective health complaints from early to mid adolescence, the developmental increase of subjective health complaints is taken into account when analysing the relationship between the two constructs across time. The main finding is that there is an association between persisting elevated levels of being bullied and a steeper developmental increase of subjective health complaints. According to the typology of stressors suggested by Wheaton (1999), this finding indicates that being bullied may be viewed as a continuous and chronic stressor, and that it is related to the development of more complaints across time. Furthermore, in line with the Cognitive Activation Theory of Stress (CATS), it may also be argued that the increase in subjective health complaints may be due to sustained arousal as a consequence of the persisting threat, or actual experience, of being bullied.

In the examination of the relationship between bullying and subjective health complaints, it is important to take into account that other common factors, such as personality, parental support, and friendships, may affect both the level of complaints and the potential stressor of being bullied. For example, it has been suggested that the pervasive mood disposition of negative affect is likely to affect both self-reports of stressors and health outcomes, and, as a consequence, the association between them may be overestimated (Watson & Pennebaker, 1989). The finding of time-specific simultaneous effects between the two constructs in the present thesis may give some support to this assumption. However, the association between the developmental factors of being bullied and subjective health complaints remains significant even after including these effects in the analysis.

4.1.6 The role of social support

As shown above, being bullied may be regarded as a chronic social stressor that individuals may experience in their social context. From a psychosocial point of view,, it may be argued that being bullied constitutes a threat to the fulfilment of fundamental social needs such as the need to belong (Baumeister & Leary, 1995), and a person's need to feel autonomous (La Guardia, Ryan, Couchman, & Deci, 2000), and therefore has potential negative effects on adolescents' health and wellbeing. On the positive side of interpersonal relationships, participation in a broad range of social relationships has been suggested to be associated with better psychological well being (Cohen & Wills, 1985). In the present thesis, both the possible negative influence of being bullied and the possible positive influence of social support from other students and teachers on the development of subjective health complaints are examined.

The results from the present thesis reveal that there is some evidence of direct effects of both student and teacher support on the initial levels of subjective health complaints. In line with this finding, it has been suggested that in particular a supportive classroom climate has a beneficial effect on the relationship between school-related stress and subjective health complaints (Torsheim & Wold, 2001). Unfortunately, the analysis in paper three does not give sufficient information in order to make any conclusions about possible moderating effects of support on the relationship between being bullied and the development of subjective health complaints in the study. However, the analysis does take into account the complexity of the relationships among the three constructs, and, noteworthy, the relationship between being bullied and an increased development of subjective health complaints was only borderline significant when the support factors were taken into account.

Another interesting finding in paper three is a strong negative relationship between social support from students and persisting levels of being bullied. One possible explanation of this finding is the "friendship protection hypothesis" (Boulton, Trueman, Chau, Whitehand, & Amatya, 1999), where it is assumed that friendships and support systems may protect the individual from being bullied. From a more critical point of view, it is also important to take into account the fact that the association between the measures of being bullied and social support from students may to some degree be inflated due to a high degree of conceptual overlap. Along these lines, it may be argued that by controlling for student support when addressing the relationship between being bullied and complaints, one may face the danger of statistical over-adjustment. As described above, the association between being bullied and health complaints was only borderline significant after controlling for student support, and it is important to take into account that the somewhat weaker effect between the two constructs may be due to statistical over-adjustment.

Interestingly, a similar association between support from teachers and persisting levels of being bullied is not found. As a possible explanation for this negative finding, existing literature on bullying has shown that only half of the students who are being bullied tell anyone about it (Whitney & Smith, 1993), and that, in many cases, the teachers are not aware of the bullying that is going on (Whitney & Smith, 1993).

4.2 Implications for practice

The main foci in the present thesis are the dimensionality and stability in subjective complaints and potential predictors related to the development of subjective health complaints in adolescence. In the following overall discussion, the possible importance of this knowledge for research and practice is discussed.

As pointed out in the introductory section, the existence of subjective health complaints is a challenge for health services and for health promoting efforts in both the adult and the younger population. Part of this challenge is the fact that these complaints often are regarded and labelled as unexplainable symptoms. It is therefore important to emphasise that even when no organic basis is found, and despite the label of "unexplained symptoms," they can still be explained using the existing and still growing body of knowledge about prevalence and possible mechanisms behind such complaints. The results from the present thesis add to this knowledge by providing information about dimensionality, development, and stability in subjective health complaints, and the reciprocal relationship between being bullied and subjective health complaints.

Although no clear solution to the question of dimensionality in subjective health complaints in the general adolescent population can be drawn from the results of the present thesis, it may still be concluded that the one ore two dimensions of subjective health complaints identified are rather general by nature. From a preventive point of view, it may therefore be important to consider broad-based interventions in general populations of adolescents in contrast to more specific interventions aiming at more specified constellations of complaints that have been identified in clinical populations (Robbins & Kirmayer, 1991; Swartz, Blazer, Woodbury, George, & Landerman, 1987). Furthermore, the indication of an increasing developmental trend of complaints from early to mid adolescence found in this study and in previous research (Aro et al., 1987; Rauste-von Wright & von Wright, 1981) should be seen in the light of other biological, social, and psychological changes that take place in this period of life. Along these lines, schools have through their established roles as socialising agents been suggested as potential and important arenas for interventions for subjective health

complaints (Haugland, 2004). In schools, it is possible to conduct broad-based interventions targeting the whole group of adolescents, and, through schools, it is possible to provide knowledge to all pupils about normal bodily processes, and the association among factors such as stress, support, lifestyle, and health complaints (Haugland, 2004). Furthermore, the clear finding of an increase in subjective health complaints among girls, in contrast to the more unclear developmental picture of complaints among boys, may suggest that girls are especially important targets for general interventions aimed at reducing and preventing internalising symptoms.

From a non-professional perspective, the development of symptoms in adolescence are often regarded as a result of "transient turmoil" or everyday complaints that follow from normal growth and development, and for a majority of adolescents these explanations may be valid (Haugland, 2004). On the other hand, the results from the present thesis also indicate that there is a substantial relative stability in subjective complaints from early adolescence to early adulthood, suggesting that there are specific groups of adolescents who have higher levels of complaints throughout adolescence. This group of adolescents may be an important target group for more specific and individually aimed interventions. Thus, it is essential that school health services detect this group in order to provide more individually aimed interventions or treatments. Finally, the indication of a consolidation of complaints over time found in the present thesis may suggest that it is important to initiate interventions and detect adolescents with higher levels of complaints early in adolescence or even during childhood.

The finding of a relationship between persistently being bullied and an increase in subjective health complaints indicates that being bullied is a predictor of the development of subjective health complaints among adolescents, existing within the school context. Over the past

number of years, a growing interest has been generated about the use of anti-bullying intervention programs in schools, and the prevalence-reducing effects of a few of these programs is well documented (Pepler, Smith, & Rigby, 2004). The findings in the present thesis suggest that these programs may have a secondary effect on the development of subjective health complaints, by reducing the number of students who experience being bullied over time. The finding of a clear negative association between student support and persisting levels of being bullied gives additional support to interventions at the student level found in many of these programs. On the other hand, the lack of association between teacher support and persisting levels of being bullied may suggest that interventions should also aim at the teacher level in order to increase their awareness about the bullying that takes place.

4.3 Strengths and limitations

A major strength of the present thesis is the use of both cross-sectional and longitudinal data measuring multiple kinds of subjective health complaints using standardised and well tested symptom checklists. Furthermore, the studies in the thesis cover a rather long time period from early adolescence to early adulthood. An additional strength of the thesis is the use of different analyses within the structural equation modeling framework, making it possible to test appropriate and sophisticated models in order to examine the relevant research questions.

A possible limitation of the studies in the thesis is the single use of self-reported measurements of health complaints. From a critical point of view, self-reports are often regarded to be too subjective compared with more “objective” measures like symptoms identified in medical examinations. On the other hand, it may be argued that in the study of subjective phenomena, such as subjective health complaints, the use of self-reports may be an advantage since they reflect personal evaluations of both health and health correlates.

Furthermore, the use of self-reports may also be regarded as more appropriate when studying health in the general populations using survey methods of a representative sample of the whole study population.

Although the symptom checklists applied in the thesis include multiple complaints, the structural factors identified may be limited by the number of complaints measured. As mentioned earlier, increasing the number of complaints may reveal a clearer underlying structure of somatic and psychological complaints, or even suggest additional underlying dimensions. Another possible limitation is the rather limited range of response categories applied in the NLHB symptom checklist. This restriction may have consequences for the comparability with the two other studies in the thesis, when addressing developmental patterns in subjective health complaints. The use of a 3-point scale may also be insufficient for detecting variation in the level of subjective health complaints across time, and it is possible that, by the use of a wider range of response categories, a more distinct developmental pattern would have been found. A third possible limitation in measurement is the length of the intervals between the measurements of complaints in the two longitudinal studies. By using too large intervals, one may fail to distinguish between shorter-term changes that occur as typical peaks and troughs of health status in contrast to the underlying changes detected over longer periods.

Finally, in the present thesis, two possible predictors of subjective health complaints are addressed. A possible weakness of the thesis is that it addresses only these few predictors, exclusively on the social level within the school context. It is likely that the development of subjective health complaints is also affected by additional variables at the social level and other levels, and the analysis in paper three may oversimplify the description of the

developmental processes. However, on the other hand, it may be argued that the analysis to a large degree takes into account the developmental processes within the constructs of being bullied and subjective health complaints, as well as the complexity in their reciprocal relationship.

4.4 Conclusion and suggestions for future research

Knowledge about the nature of subjective health complaints in adolescence is important because of the suffering and reduction of life quality accompanying these complaints, and because it will increase our understanding of how to meet the challenge of subjective health complaints in the younger population. The main goal of the present thesis is to contribute to such knowledge, focusing on the dimensionality, the development, and psychosocial predictors of subjective health complaints. The findings in the present thesis confirm that the patterns of subjective health complaints may develop already in adolescence. Consequently, interventions in adolescence may also have an impact on the prevalence of complaints later in life. Furthermore, the present thesis shows that psychosocial predictors, like being a victim of bullying and social support in the school context, may be important factors regarding the development and the prevalence of subjective health complaints in adolescence.

Although the insights provided by the present thesis add to our understanding of the nature of subjective health complaints, more research is needed. More knowledge about the possible underlying psychological and somatic dimensions in subjective health complaints is called for, and future studies should examine if different relationships exist between the two dimensions and potential predictors in order to identify possible different aetiological patterns. Furthermore, studies using symptom checklists with a wider range of complaints are likely to add to our understanding of the underlying dimensions of complaints.

The present thesis illustrates that using longitudinal data, as well as analyses that take into account potential developmental trends in subjective health complaints, may provide valuable information about the relationship between subjective health complaints and such potential predictors. A similar analytic approach should therefore be considered in future research on subjective health complaints.

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