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Wellbeing among school children in grades 1-10: Promoting and adverse factors

Thesis for the degree of Philosophiae Doctor

Trondheim, September 2011

Norwegian University of Science and Technology
Faculty of Medicine
Department of Public Health



NTNU – Trondheim
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To the participants in the
Trivsel for Mestring
school project

Skoletrivsel og subjektive helseplager: Oppdrift og belastninger blant elever i grunnskolen

Skolebarns trivsel og helse får stor oppmerksomhet. Trivselen er jevnt over god blant elever i vestlige land, men symptomer som magesmerter og vondt i hodet forekommer hyppig. Slike vanlige plager kan forringe dagliglivet og føre til økt skolefravær. Plager i barndommen kan også være relatert til senere emosjonelle og somatiske problemer. Vi vet imidlertid langt mindre om forhold som kan påvirke trivsel og helsesyntomer. Hensikten med våre studier var å undersøke betydningen av antatte oppdriftsfaktorer (engelsk: promoting factors) og antatte belastninger i forhold til skoletrivsel og opplevde helseplager (tristhet, engstelse, hodepine og vondt i magen). Som en del av dette, ønsket vi å se på samsvaret mellom elevers og viktige voksenpersoners rapportering av mulige påvirkningsfaktorer. Studiene bygger på tverrsnittsdata fra 419 skolebarn ved fem skoler i Midt-Norge.

Hovedfunn

I Artikkel 1 har vi undersøkt sammenhengen mellom mulige påvirkningsfaktorer og elevenes skoletrivsel. Elever, og spesielt gutter, som liker skolearbeidet og/eller synes de får nødvendig hjelp fra lærer, har bedre skoletrivsel enn de som er misfornøyd med skolearbeidet og lærerhjelp. For jentene er det en sterk sammenheng mellom opplevd plaging i timene og dårlig skoletrivsel.

I Artikkel 2 har vi studert sammenhengen mellom mulige påvirkningsfaktorer og subjektive helseplager. Opplevd ensomhet er sterkt forbundet med helseplager. Hos begge kjønn er ensomhet relatert til tristhet, og hos jenter er ensomhet i tillegg relatert til engstelse og hodepine. Derimot har jenter som rapporterer at de får nødvendig hjelp fra lærer, sjeldnere vondt i magen.

Artikkel 3 har fokus på elever som blir plaget (erta, fysisk plaget, utestengt) i friminuttene. Det er lavt til moderat samsvar mellom hvem lærere og foreldre rapporterer som plaget og det elevene rapporterer selv. For elevene gjelder at jo oftere de opplever å bli plaget, jo oftere rapporterer de tristhet, engstelse, hodepine og/eller vondt i magen.

Elever som de voksne mener er plaget i friminuttene, har i følge elevenes egen rapportering mindre helseplager.

Konklusjon

Skoletrivsel og subjektive helseplager kan være påvirket av forskjellige forhold, og faktorer med mulig påvirkningskraft kan ha ulik betydning for jenter og gutter. I forhold til skoletrivsel, kan våre resultater tyde på at det som foregår i timene er vel så viktig som relasjonelle forhold i friminuttene. Gutter kan være mer mottagelige for skolefaglige oppdriftsfaktorer som hjelp fra lærer, mens jenter kan være mer sårbare for relasjonelle belastninger som det å bli plaget i timene. Videre kan resultatene tyde på at vi må være mer oppmerksomme på opplevd ensomhet i skolen. Ensomhet ser ut til å ha sterk sammenheng med subjektive helseplager, særlig for jenter. Ellers kan det være verdt å merke seg at elever, lærere og foreldre kun har et moderat samsvar i rapportering av antatte belastninger (som eksempel plaget i friminuttene). Men hvilken betydning grad av enighet omkring opplevd plaging kan ha for elevers senere trivsel og helse, er så vidt vi vet ukjent, og dette må undersøkes nærmere i framtidige studier.

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This thesis is a result of collaboration with academic staff at university and colleagues in the local community. I see four cornerstones that were each absolutely necessary. In the first years after the millennium, the “Trivsel for Mestring” (TfM) school project on wellbeing provided data that are used in the studies. As a school psychologist I really appreciated working in the project together with school nurses and school managers as well as with other advisors. I acknowledge everyone’s enthusiasm and ideas during all those hours of planning and implementing TfM – in order to make schools a better place for the coming generation. Special thanks go to the children, their parents and teachers who completed questionnaires. Grateful thanks also go to the headmasters and school nurses who organized the data collection.

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Trondheim, April 2011

Audhild Løhre

Schools and promoting strategies

What creates children's wellbeing in school? That was the main question that I kept coming back to during my many years as a school psychologist. We observed many factors that adversely influenced the children, and the literature confirmed our observations. But knowledge related to protective processes, i.e. mechanisms that may protect against adverse outcomes (Rutter 1987) was sparse, as was also the case for promoting processes as illustrated by Bengt Lindström's *Health in the River of Life* (Eriksson and Lindström 2008). Therefore, I kept asking myself: Are we doing the right thing? Do we promote a practice in school that stimulates the children in the right direction? And how do we best facilitate children's wellbeing in school?

In another field, a famous sociologist, Aaron Antonovsky, raised the following general research question: What causes health? He wanted to study the importance of people's resources and their capacity to create health rather than to focus on causes of disease (Lindström and Eriksson 2005). His contributions are valuable in the development of health promotion (Eriksson and Lindström 2008, Lindström and Eriksson 2009).

In the interpretation of the results in this thesis, we lean on the ideas of Antonovsky related to health promotion (Eriksson and Lindström 2008, Lindström and Eriksson 2009). In other words, in addition to assessing what we assume to be adverse factors, we also search for factors that may promote children's wellbeing or health. Our data are limited to the school setting. We analyze children's experiences at school and we assess information from teachers and parents on corresponding topics. By making these choices of limitation, we exclude other essential information, e.g. children's experiences earlier in life, their personal characteristics, and their relations to other people as well as characteristics of the family (Due et al. 2011). Nonetheless, our focus on situational mechanisms (Rutter 1987) in the school setting may provide a basis for developing useful strategies that will promote wellbeing among school children.

The TfM school project

In this thesis, we use data from the TfM school project. The Norwegian wording “Trivsel for Mestring” (TfM) may be translated to “Thriving for Mastery”, although the Norwegian word “trivsel” has no direct synonyms in English, and the word has also been indicated to mean “flourishing” (Lindström and Eriksson 2009). Five schools from inland to coastal areas in Møre and Romsdal County participated in the project, and two surveys were carried out, the first in May to June 2002, and the second two years later. Children in grades from 1 to 10, teachers, and parents contributed with information on the children’s wellbeing and health, and on possible influential factors.

The studies of the thesis are based on data from the five schools in the first survey. Information from different sources (children, teachers, and parents) was linked with a specific code on each child.

List of papers

Paper 1

Audhild Løhre, Stian Lydersen, Lars J. Vatten
School wellbeing among children in grades 1 - 10
BMC Public Health 2010, 10:526

Paper 2

Audhild Løhre, Stian Lydersen, Lars J. Vatten
Factors associated with internalizing or somatic symptoms in a cross-sectional study of school children in grades 1-10
Child and Adolescent Psychiatry and Mental Health 2010, 4:33

Paper 3

Audhild Løhre, Stian Lydersen, Bård Paulsen, Magne Mæhle, Lars J. Vatten
Peer victimization as reported by children, teachers, and parents in relation to children's health symptoms
BMC Public Health 2011, 11:278

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Figure 2. Anxiety (%) across school grades in the TfM school project

Figure 3. Stomach ache (%) across school grades in the TfM school project

Figure 4. Headache (%) across school grades in the TfM school project

Figure 5. Victimization (%) across school grades in the TfM school project

Abbreviation

TfM: Trivsel for mestring (Thriving for Mastery)

Summary

Wellbeing among school children in grades 1-10:

Promoting and adverse factors

Background and objectives

Wellbeing and health among school children are of great concern. Health symptoms may influence absence from school, sleep, and other aspects of daily life and perceived pain in childhood may also be a marker for later mental or somatic problems. Contributors to wellbeing and health are, however, less explored. Our aim was to assess the impact of assumed promoting and assumed adverse factors on school wellbeing and health symptoms (sadness, anxiety, stomach ache, and headache). As a component of this aim we wanted to study the agreement between children and significant adults in their reports of possibly influential factors.

Methods

In cross-sectional studies of 419 children from five schools in coastal to inland areas in a region in central Norway, we assessed the associations of potentially influential factors with self-reported school wellbeing and health symptoms in logistic regressions.

Results

In Paper 1 we assessed the associations of assumed promoting and assumed adverse factors with school wellbeing in proportional odds logistic regressions. In multivariable analyses, children, and especially boys, who enjoyed their school work or perceived to get necessary help from teachers showed higher prevalence of school wellbeing than those who were dissatisfied with school work or teacher support. For girls, the relational experience of being bothered in class was associated with lower degrees of school wellbeing.

In Paper 2 we studied the associations of assumed promoting and assumed adverse factors with health symptoms in proportional odds logistic regressions. In multivariable analyses, perceptions of getting necessary help from teachers showed a significant and negative association with stomach ache in girls. For both genders, loneliness was associated with self-reported sadness, and in addition, loneliness was related to higher prevalence of anxiety and headache among girls.

In Paper 3 we assessed the concordance between children, teachers, and parents in reports of victimization caused by bullying. Further, in binary logistic regression, we studied the relation between reported victimization and health symptoms as reported by the children. In reports of victimization, the agreement was low to moderate for the three sources of information. Children who reported being victimized had a higher prevalence of sadness, anxiety, stomach ache, and/or headache, and the results showed a gradient, such that higher frequency of victimization was related to higher loads of health symptoms. Victimization as reported by teachers or parents showed weaker relations to health symptoms reported by the children, and only for anxiety, there was a clear effect of dose.

Conclusions

Children's perceived school wellbeing and self-reported health symptoms may partly be influenced by different factors, and there may be gender differences. Regarding school wellbeing, our results suggest that factors related to the classroom situation may be more influential than relational experiences in recess, and that boys may be more receptive to promoting factors such as teacher support, whereas girls may be more vulnerable to adverse relational aspects in the classroom. Perceived loneliness should perhaps be given more attention in schools. Loneliness was strongly related to subjective health symptoms, especially in girls. Moreover, the low agreement in reports of an assumed adverse factor (victimization) may be worth noticing. But the impact of agreement about peer victimization on children's later wellbeing and health is to our awareness unknown, and should be assessed in future studies.

Introduction

Children's wellbeing is of great public concern and schools may provide an essential impact on children's wellbeing. Generally, risk factors have received a lot of attention whereas factors that may promote children's wellbeing have received less focus. It is not clear, however, whether the same or different factors may influence children's subjective school wellbeing and their perceived health symptoms. Furthermore, there is little knowledge on the comparison of children's and significant adult's perspectives on possibly influential factors (e.g. peer victimization). In this thesis, we have addressed children's wellbeing by studying factors that may be associated with their self-reported school wellbeing and their subjective health symptoms (sadness, anxiety, stomach ache and headache). Figures of the four health symptoms and of perceived peer victimization across school grades are presented in the introduction and will be discussed in relation to external validity of our results.

School wellbeing

The construct of school wellbeing

In the 1970s, Epstein and colleagues initiated research on the quality of life among children at school (Epstein and Mcpartland 1976). There is no general consensus, however, on how to identify the global concept of wellbeing (De Chavez et al. 2005), and therefore, the concept of school wellbeing has not been clearly defined. Consequently, the wellbeing among school children has been measured by different instruments (St Leger 2000). Opendakker and colleagues, for example, used a questionnaire with eight indicators of students' wellbeing (Opendakker and Van Damme 2000). Five of the indicators were related to academic issues (including learning tasks, attentiveness, and academic self-concept), two were devoted to relational issues (social integration and relationships), and one indicator included general wellbeing at school. Konu and

colleagues presented a theoretically based model for school wellbeing with four domains: school conditions, social relationships, means for self-fulfilment in school, and health status (Konu et al. 2002, Konu and Rimpela 2002). Their main intention was to construct an evaluation instrument that could be used as a basis for improvements in schools (Konu and Lintonen 2006a); however, the model does not provide a global school wellbeing score for each child.

In addition to measurements on wellbeing in school, scales have been developed to explore the closely related concept “school satisfaction” (Epstein and Mcpartland 1976, Huebner 1994, Randolph et al. 2009, Aarø et al. 1986). These satisfaction scales have a minimum of three items; like the measurements on wellbeing in school, however, these scales also differ in their thematic profiles. The constructs of school wellbeing and school satisfaction have received general interest, and it has been suggested that students’ satisfaction with their school experiences should regularly be included in assessment protocols of students’ general wellbeing, academic achievement, and behaviour (Zullig et al. 2009).

Factors that contribute to school wellbeing

Few studies have assessed factors that may contribute to children’s wellbeing in school, and to our knowledge, there are no longitudinal studies that have assessed predictors of satisfaction or wellbeing among school children. However, some researchers have used school satisfaction as the “outcome” measure in cross-sectional studies, applying data from the World Health Organization international surveys: Health Behaviour in School-aged Children (HBSC). From those studies, it was suggested that support from the teachers (often measured as a sum score of “teachers give pupils help” and “teachers show interest in pupils”) may be the single most important contributor to school satisfaction (Danielsen et al. 2009, Samdal et al. 1998, Takakura et al. 2005).

Although the studies are cross-sectional and report on concurrent associations, it seems reasonable to assume that help from the teacher precedes the wellbeing, and thus the relation may indicate a possible direct association from support to wellbeing. A recent study on Dutch and Finnish school children (Randolph et al. 2010) confirms the

importance of support from teachers by showing a close link between teacher likeability (“my teachers are nice”) and school satisfaction. Other factors that appear important for school satisfaction include children’s experiences of feeling safe and being treated fairly (Samdal et al. 1998), and their perceptions of high demands from teachers in combination with the possibility to influence their own situation (Takakura et al. 2005).

Health symptoms

Other measures of children’s wellbeing may be their own perceptions of health symptoms. It is well documented that ill health in childhood and adolescence may lead to restrictions in daily life, including absence from school as well as sleep and eating disorders (Roth-Isigkeit et al. 2005, Zhang et al. 2010). Moreover, in addition to showing important associations with current problems, children’s perceptions of ill health may be linked to problems later in life. It has, for example, been reported that somatic symptoms in adolescence may be associated with medically unexplained symptoms in adulthood (Hotopf et al. 1999), and also with depression and panic attacks (Zwaigenbaum et al. 1999).

Health symptoms are often categorized as emotional (internalized) or somatic symptoms and the different emotional and somatic symptoms have shown high comorbidity (Anttila et al. 2004, Brady and Kendall 1992, Dufton et al. 2009, Kristjansdottir 1997, Snyder et al. 2009, Strine et al. 2006). It is, however, not clear whether the complaints should be regarded as two separate dimensions, one psychological and one somatic (Haugland et al. 2001), or as one health dimension (Eriksson and Sellström 2010, Ravens-Sieberer et al. 2008).

Emotional symptoms

Anxiety and depression are the most common internalized problems (Zahn-Waxler et al. 2000). Prevalence estimates of anxiety disorders have been reported to vary between 6-18% in childhood and adolescence (Zahn-Waxler et al. 2000), and anxiety tends to predate depression (Brady and Kendall 1992, Snyder et al. 2009). This has been

confirmed in a study in which teacher ratings of changes in child anxiety from the age of 5 to 9 years were strongly associated with the children's self-reported depressive symptoms at nine years of age (Snyder et al. 2009). Signs of anxiety are typically somatic responses to emotional activation (Suveg et al. 2009).

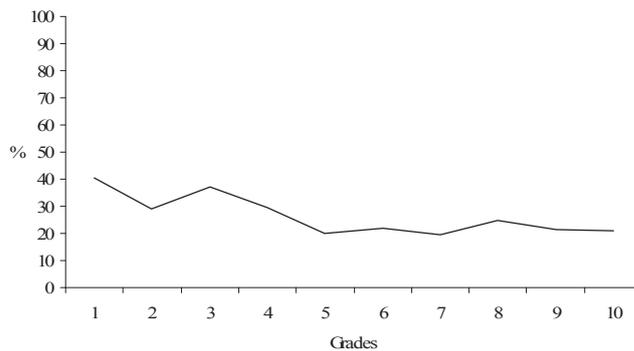


Figure 1. Sadness (%) across school grades in the TfM school project. Children's self reports of sadness (N = 413) experienced sometimes, often, or always. Exact linear by linear test for trend $p = 0.015$

Meta-analyses have shown a high degree of co-morbidity for anxiety and depression, estimated to be from 20% to 50% (Zahn-Waxler et al. 2000). Although depressive disorders are rare among young children, in adolescence the prevalence may be as high as 8% (Zahn-Waxler et al. 2000). In contrast to anxiety, where the key emotion seems to be fear (Blumberg and Izard 1986), the key emotion of depression is sadness (Blumberg and Izard 1986, Brady and Kendall 1992, Suveg et al. 2009), and typically, depressed persons show a lack of positive affect (Suveg et al. 2009).

Moreover, children with anxiety or depressive symptoms are characterized by a poor ability to identify emotions (Suveg et al. 2009, Zeman et al. 2002). It has been reported that children with anxiety may especially have problems in their interpretation of other persons' emotional expressions, and that children with depressive symptoms may have maladaptive strategies in the regulation of negative emotions (Zeman et al. 2002).

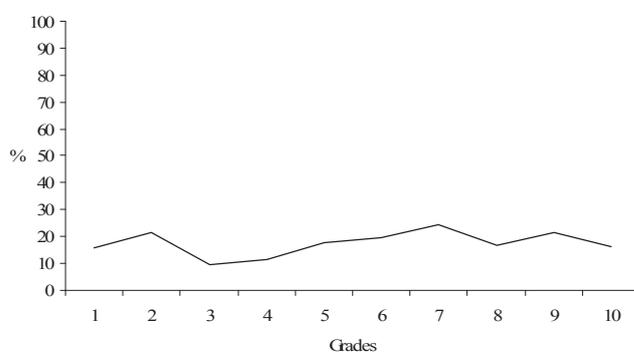


Figure 2. Anxiety (%) across school grades in the TFM school project. Children's self reports of anxiety (N = 411) experienced sometimes, often, or always. Exact linear by linear test for trend $p = 0.502$

Somatic symptoms

At a young age, headache and stomach pain appear to be the most prevalent physical complaints (Berntsson et al. 2001). Whereas stomach pain may be more frequent among younger children (Borge et al. 1994, Fritz et al. 1997, Kristjánsdóttir 1996), the prevalence of headache seems to increase with age, and be more prevalent in adolescence (Lewis 2007, Santinello et al. 2009, Strine et al. 2006).

It has been suggested that recurrent abdominal pain is the most frequent paediatric symptom (Fritz et al. 1997), and the prevalence of the condition may range from 10-45% (Plunkett and Beattie 2005). Recurrent abdominal pain, characterized by repeated episodes of pain that rarely have an identifiable organic explanation, interferes with the child's activities (Walker et al. 1995). Perceived abdominal pain in childhood may also be a marker for both somatic and mental problems later in life (Apley and Hale 1973, Campo et al. 2004, Campo et al. 2001). Follow-up studies of former patients with recurrent abdominal pain have suggested that about 30-50% still have abdominal pain as adults, and in addition, about one third complain of non-abdominal symptoms, especially headache (Apley and Hale 1973, Christensen and Mortensen 1975). Walker and colleagues (1995) compared children who were diagnosed with recurrent abdominal pain

to children without such problems. At follow-up 5-6 years later, the previously diagnosed children had significantly more abdominal pain, higher levels of other somatic symptoms, and higher absence from school or work than the children who had not been diagnosed with abdominal pain at the beginning of follow-up (Walker et al. 1995).

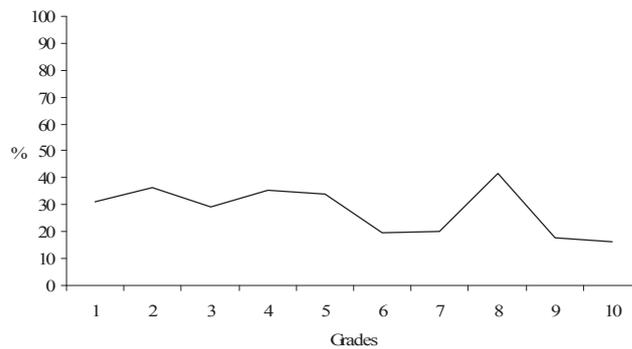


Figure 3. Stomach ache (%) across school grades in the TFM school project. Children's self reports of stomach ache (N = 414) experienced sometimes, often, or always. Exact linear by linear test for trend $p = 0.033$

In Nordic as well as in international studies, prevalence estimates of self-reported stomach pain are higher at 11 than at 15 years of age and higher for girls than for boys (Haugland et al. 2001, Kristjánsdóttir 1996, Natvig et al. 1999, Torsheim et al. 2006). Up to one fourth of the children may report frequent abdominal pain (Haugland et al. 2001, Torsheim et al. 2006) and approximately 50% report an over all prevalence (Kristjánsdóttir 1996, Natvig et al. 1999). It is possible that the prevalence may be fairly stable in childhood and decrease in the transition to puberty. One example of stability in childhood is represented by a longitudinal study that followed 136 Norwegian children from four to 10 years of age; the prevalence of stomach pain at 10 years was about the same as during the baseline examination 6 years earlier, and children who had stomach pain at a young age, also tended to report the problem at follow-up (Borge et al. 1994).

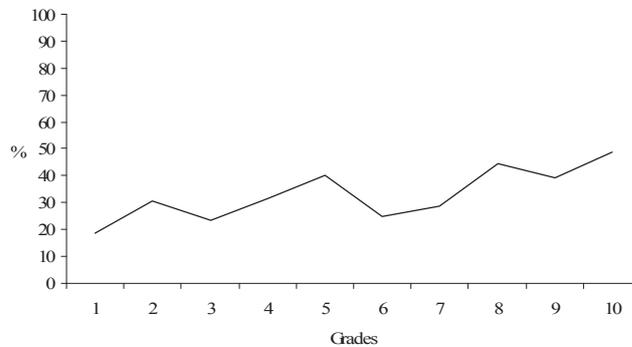


Figure 4. Headache (%) across school grades in the TFM school project. Children's self reports of headache (N = 411) experienced sometimes, often, or always. Exact linear by linear test for trend $p = 0.003$

Frequent or severe headache is less prevalent in childhood than in adolescence (Strine et al. 2006). In a review, it was estimated that 2.5% of 7-year-old children and about 15% of children at the age of 15 may have frequent or severe headache (Lewis 2007). Also, the prevalence of less frequent and less severe headache seems to be higher in adolescence. Lewis (2007) reported an over all increase in headache from around 37-51% in elementary school children to around 57-87% in high school. Before puberty, the prevalence of reported headache seems to be higher in boys than girls, but after puberty the prevalence among girls is higher (Lewis 2007, Santinello et al. 2009). Prior to elementary school, children rarely complain about headache (Borge et al. 1994).

Factors promoting wellbeing at school

Belonging to school

One research path has been to study children's wellbeing in relation to their perception of belonging to school, or their connection to school (Blum and Libbey 2004). In addition to the terms belongingness or connectedness, several other terms have been used, including school attachment, school bonding, school engagement and school climate (Libbey

2004). One definition of school connectedness may be "...the belief by students that adults in the school care about their learning as well as about them as individuals." ("Wingspread declaration on school connections" 2004). Others have defined "school bonding" as the presence of attachment (an emotional link to school) and commitment (an investment in a group) (Libbey 2004).

In a large study of more than 36,000 students (in grades 7-12), caring and connectedness were strongly related to good health and wellbeing (Resnick et al. 1993). The researchers suggested that it may be useful to strengthen the sense of belonging, especially in high risk groups. A few years after their 1993 publication, Resnick and colleagues published the first cross-sectional analysis of data from the National Longitudinal Study of Adolescent Health (ADD HEALTH study) in the United States, and suggested that school connectedness was strongly and negatively associated with emotional distress, the use of substances/drugs, and/or suicidal thoughts (Resnick et al. 1997). Corresponding results have been reported by others (Bonny et al. 2000, McNeely et al. 2002).

Connection to school may also have long term consequences (Bond et al. 2007). In intervention studies that aimed to increase the students' school bonding, Catalano and colleagues found that intervention was associated with higher levels of academic success, and with reductions in school and social problems, including violence, alcohol abuse, and risky sexual behaviour measured six and nine years after the intervention (Catalano et al. 2004).

The influence of belongingness to school on health status has also been studied. In a one year follow-up, Shochet and colleagues found high correlations between belongingness and health at both points in time (T1 and T2). School belongingness predicted health status one year later, but health status at T1 was not associated with school belongingness at T2 (Shochet et al. 2006). Further, researchers have assessed whether certain dimensions of belongingness could be more important than others. They have found that teacher support (fair treatment and caring) was positively associated with health behaviour 12 months later, but social belonging (feeling close to people at school, feeling like a part of school, and being happy to be at school) was not associated with the later health scores. (McNeely and Falci 2004). The distinction between friendship and

school related factors was emphasized in another longitudinal study; good school connectedness in addition to good friendship relations predicted the best health outcomes. Good friendship relations but low school connectedness, however, was associated with higher risk of emotional symptoms and substance abuse (Bond et al. 2007).

Peer support

In a review of the literature, Ladd suggested that friendships and friendship quality could be important predictors of children's emotional wellbeing, whereas peer rejection was considered to predict emotional problems and adjustment difficulties (Ladd 1999). The quality of peer relationships may also contribute to school adjustment (Ladd et al. 1996, 1997), and a mutual best friend was reported to protect against emotional problems caused by peer victimization (Hodges et al. 1999). In addition, good relations to classmates were associated with lower prevalence of emotional problems (Bru et al. 1998), and perceived support from classmates may contribute to higher academic initiative among students (Danielsen et al. 2010). It has been suggested that support from friends may influence children's self-efficacy (belief in their own capacity) and thereby indirectly influence their psychosocial wellbeing (Vieno et al. 2007).

Teacher support

Support from teachers has been related to various outcome measures in childhood. In relation to belongingness to school, one or more aspects of teacher support have typically been included as explanatory variables for health symptoms or health related behaviours. The ADD HEALTH study used six questions to study children's connection to school (McNeely and Falci 2004). Three items were related to social belonging (see above), and the other three to teacher support (fair treatment, caring, and trouble getting along with teachers). As described in the section on school belongingness, the dimension of teacher support had greater impact than social belonging on health outcomes (Bond et al. 2007, McNeely and Falci 2004).

Teacher support may also be important for children's academic initiatives in class (Danielsen et al. 2010) and for children's achievement (Baker 2006). Typically, teacher support may comprise an academic component related to the children's school work and an emotional component related to caring. In one study, the teacher's academic support appeared to be more strongly associated with emotional problems and somatic pain than was the teacher's emotional support (Bru et al. 1998). However, in most studies the two dimensions of teacher support are included in the same explaining variable, for example in studies of school satisfaction (Samdal et al. 1998, Takakura et al. 2005).

Perceived teacher support has shown strong associations with school satisfaction (Danielsen et al. 2009, Danielsen et al. 2010, DeSantis King et al. 2006, Randolph et al. 2010, Samdal et al. 1998, Takakura et al. 2005, Verkuyten and Thijs 2002). In some studies, teacher support is measured by one single item ("my teachers are nice") that denotes teacher likeability (Randolph et al. 2010, Verkuyten and Thijs 2002), and other studies include two or more items (for instance; "teachers give pupils help when needed", and "teachers show interest in pupils") (Samdal et al. 1998, Takakura et al. 2005).

Adverse factors

Academic distress

Children with learning disabilities or with low academic achievement may have more emotional problems and lower social adjustment than children with average or high academic achievement (Heath and Ross 2000, Kemp and Carter 2002, Nowicki 2003, Valås 1999, Wiener and Schneider 2002). Academic and emotional functioning may to some degree be stable (Roeser et al. 1999) and influence each other (Flook et al. 2005) throughout the school years. In comparison with children without learning disabilities, boys but not girls with learning disabilities report fewer mutual friends (Wiener and Schneider 2002) and more loneliness (Williams and Asher 1992). On the other hand, girls but not boys with learning disabilities appear to have more symptoms indicating depression, negative self-esteem, and interpersonal problems than their same-sex peers without learning disabilities (Heath and Ross 2000), and further, personal belief in low

academic capacities may predict depression in the long term (Bandura et al. 2003). However, the majority of children and adolescents with learning disabilities appear to be within the normal range of psychosocial adjustment; thus, it has been suggested that approximately one third have difficulties related to social adjustment, as compared to 10-15% of children without learning disabilities (Greenham 1999).

Perceived disturbances in class may be related to lower academic achievement (Samdal et al. 1999) and lower prevalence of school satisfaction (Samdal et al. 1998). On the other hand, perceived school satisfaction may be positively associated with academic achievement (Samdal et al. 1999), and there is evidence that appraisal of academic achievement in peer groups may strengthen individual academic achievement (Chen et al. 2003).

Generally, the social and psychological environment at school appears to contribute to children's academic performance (Hawkins et al. 1999, Klem and Connell 2004, Koth et al. 2008). This was clearly illustrated by Catalano and colleagues (2004) in studies that aimed to strengthen children's bonding to school. Among several essential outcomes, academic achievement improved after comprehensive interventions including both parent and teacher training together with programs to enhance children's social and emotional skills. Even six to nine years after the intervention ended academic success was higher among children from intervention schools than among children who had attended schools without the bonding interventions (Catalano et al. 2004).

Moreover, studies of individual capacities may support the above findings. For example, it has been reported that children's self-esteem may be positively associated with academic achievement (Valås 1999), and prosocial behaviour (degree of helpfulness, sharing, kindness, and cooperativeness) has also shown to be related to academic achievement (Bandura et al. 1996). The impact of prosocial behaviour was further underlined in subsequent prospective studies that demonstrated the relation; children's prosocial behaviour measured in third grade strongly predicted their academic achievement five years later. After adjustment for previous academic achievement, the relation was equally strong, whereas early aggressive behaviour showed no significant relations to later academic achievement (Caprara et al. 2000).

Loneliness

Friends are hard to get for me

If you were me, you would see

...

If I had a friend

I would recommend

friends for any other friend

Chad, 10 years old (cited by Parker et al. 1999)

Young children usually understand the meaning of the word loneliness. Among 46 children (aged 5-7 years) who were interviewed about loneliness, 43 (93%) included both aloneness and sadness in the concept (Cassidy and Asher 1992), and it has been suggested that children develop consciousness about the emotion “sadness” around the age of five to seven years (Glasberg and Aboud 1982).

The differences between aloneness and loneliness seem to be essential. Some people can be alone without feeling lonely, and in other situations, a person may feel lonely together with a lot of people. Loneliness is a hurtful feeling, whereas aloneness may give time for the reflection and rest that is necessary for human growth (Buchholz and Catton 1999, Larson 1999). More than 50 years ago, the relational psychoanalyst Sullivan suggested that loneliness is the most painful of all human experiences, and that loneliness reflected an unmet need for contact (Buchholz and Catton 1999). Peplau and Perlman defined loneliness as a negative emotional response to a discrepancy between desired and achieved levels of social contact (Baskin et al. 2010).

Scales have been developed to explore and measure loneliness among children; first for use in elementary school (Asher et al. 1984, Asher and Wheeler 1985), and later, a revised version for younger children (Cassidy and Asher 1992). The prevalence of loneliness (most of the time or always) among children has ranged between 7 and 15% in

the various studies (Asher et al. 1984, Cassidy and Asher 1992, Galanaki and Kalantzi-Azizi 1999). The prevalence reported by popular children with many friends was relatively low, and children with no friends reported the highest loneliness scores (Asher et al. 1984). The prevalence does not appear to differ substantially across school grades or by gender (Mahon et al. 1994).

The literature on loneliness and health is scarce, especially related to the relation of loneliness with somatic illness. To our knowledge, no study has reported assessments of loneliness with the prevalence of stomach pain or headache. However, there is strong evidence that loneliness is associated with depression (Galanaki et al. 2008, Koenig and Abrams 1999), and loneliness scores at five and nine years of age may predict depressive symptoms in adolescence (Qualter et al. 2010). For children before school age (5-6 years) and for older children, loneliness appears to be associated with anxiety (Coplan et al. 2007, Goossens and Marcoen 1999, Inderbitzen-Pisaruk et al. 1992), and loneliness may also be associated with learning disabilities (Valås 1999, Williams and Asher 1992).

Few studies have proposed initiatives to reduce the feeling of loneliness among school children. However, longitudinal studies conducted by Hawkins and colleagues showed reduced loneliness after school bonding interventions that included training of children's social and emotional skills (Hawkins et al. 1999). Also, the result of a recent cross-sectional study of eighth grade students suggested that belongingness may influence the effect of loneliness on depression (Baskin et al. 2010). Thus, the results suggested that lonely children with a high degree of belongingness to school may be less depressed than lonely children with a medium or low degree of belongingness.

Victimization

In the last decades, bullying and victimization (being bullied) in schools have received growing attention. Definitions of bullying have been developed and discussed for more than 20 years, and the definitions usually include aggressive behaviour, repetitive negative acts and imbalance of power (Smith 2004, Smith and Brain 2000). Bullying and the subjective experience of being victimized have often been measured by the frequency

of verbal and/or physical harassment and/or social exclusion (Olweus 1993). Recently, bullying via internet or mobile phones has also been studied (Li 2007, Smith et al. 2008).

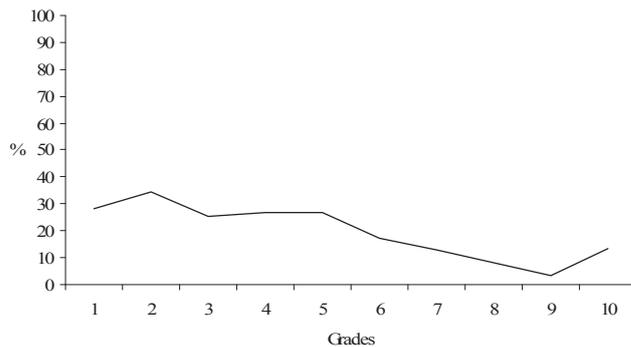


Figure 5. Victimization (%) across school grades in the TrM school project. Children's self reports of victimization (N = 417) experienced sometimes, about every week/every day. Exact linear by linear test for trend $p < 0.001$

Research in schools has shown variation in the prevalence of victimization, but the varying estimates may depend on the methods used to measure victimization, as suggested by Card (Smith 2004). Moreover, there seems to be a considerable variation between countries (Due et al. 2005, Eslea et al. 2004), even when the same methods have been applied. A consistent finding has been that victimization occurs more often during the first years in school, as first suggested in 1993 (Olweus 1993, Whitney and Smith 1993). Later, this finding was verified in 12 studies from Europe and Australia (Smith and Madsen 1999). More recent data from Norway (Solberg et al. 2007) indicate a gradual reduction in victimization from grades 4 to 10.

There seems to be a consensus that children who are subject to bullying have more problems with health and psychosocial adjustments than other children. A recent meta-analysis showed that victimized children had a significantly higher risk of psychosomatic problems than children who were not involved in bullying (Gini and Pozzoli 2009). Similar strong links between victimization and mental health problems have been reported in another meta-analysis and in a review (Arseneault et al. 2010,

Hawker and Boulton 2000). Also, many studies have shown strong associations of victimization with poor psychosocial adjustment (Gini et al. 2007, Nansel et al. 2001, Rigby 2003) emotional problems (Bond et al. 2001, Fekkes et al. 2004, Graham and Juvonen 1998, Kaltiala-Heino et al. 2000), and psychosomatic complaints (Fekkes et al. 2004, Gini et al. 2007, Greco et al. 2007, Kaltiala-Heino et al. 2000).

The extent of the health problems seems to be associated with the level of victimization (Due et al. 2005), and persistent victimization may also predict internalizing problems (Due et al. 2005, Rosen et al. 2009). The association of victimization with health problems seems to be fairly similar between countries (Nansel et al. 2004). However, children from low income families may be more exposed to bullying (Due et al. 2009b), and for those children the effects of victimization may be more harmful and have more serious long-term implications (Due et al. 2009a).

Altogether, intervention programs aimed to prevent bullying and victimization have shown only modest effects (Merrell et al. 2008, Vreeman and Carroll 2007). Multi-disciplinary programs that involve the whole school have better results than curriculum programs (Vreeman and Carroll 2007). Typically, intervention programs aiming to reduce bullying were more likely to influence knowledge and attitudes than to reduce bullying behaviour (Merrell et al. 2008), and the intervention programs appear to have little effect on health outcomes related to victimization (Merrell et al. 2008, Vreeman and Carroll 2007).

Informant concordance

Reports from different informants on children's health or behaviour vary, and typically the concordance between informants has been low to moderate (Achenbach et al. 1987, De Los Reyes and Kazdin 2005). Only a few studies have assessed the consistency of perceived victimization between children and their own parents, but those studies have also shown low to moderate agreement between informants (Holt et al. 2009, Ladd and Kochenderfer-Ladd 2002). In the study by Holt and colleagues (2009) parents reported that 42% of the children were victimized, and the children confirmed this in 11% of the

cases. A weakness of the study was that only 28% of the parents completed the questionnaires.

Studies of the concordance between children's and teachers' reports of victimization have also reported low agreement (Cornell and Brockenbrough 2004, Ladd and Kochenderfer-Ladd 2002), or no agreement (Nuijens et al. 2009). Some researchers have compared self-report with peer nominations, and all those studies have reported low to moderate concordance (Branson and Cornell 2009, Cornell and Brockenbrough 2004, Graham et al. 2003, Ladd and Kochenderfer-Ladd 2002, Lee and Cornell 2010, Nuijens et al. 2009).

The informant discordance in reporting victimization corresponds to the low consistency in relation to reporting of health issues (Jozefiak et al. 2008, Munkvold et al. 2009) and child adjustment (Achenbach et al. 1987). The associations are generally highest among the same type of informants, such as parents, and lowest between children's self-reports and the reports of others (Achenbach et al. 1987, Ladd and Kochenderfer-Ladd 2002).

Researchers differ, however, in how they regard the low concordance between respondents. Some have suggested that a combination of different sources of information may enrich the understanding of children's behavioural adjustments or quality of life (Achenbach et al. 1987, Jozefiak et al. 2008, Ladd and Kochenderfer-Ladd 2002). Others prefer to handle information from different sources separately, especially in relation to psychopathology (Munkvold et al. 2009, Offord et al. 1996), or a consensus may be derived by using information from different perspectives and settings (Kraemer et al. 2003, Perren et al. 2006). But regarding peer victimization there is a lack of knowledge on how to handle informant agreement – discordance.

Objectives of the thesis

A major objective of this thesis was to assess the impact of factors that were assumed to promote wellbeing, and factors that were assumed to be adverse factors in relation to children's wellbeing at school. Both the assumed promoting and the assumed adverse factors were employed to assess the prevalence of children's self-reported school wellbeing and health symptoms. As a component of this aim, we wanted to study the concordance between children, teachers, and parents in the reporting of factors that are assumed to influence children's wellbeing. The objectives of the thesis are described in more detail in the following.

Contributors to school wellbeing (Study 1)

It is well documented that academic problems or hurtful relational experiences may influence children's general wellbeing and satisfaction at school. Factors that may support the children and ease potential burdens are, however, less explored, and there is a lack of studies that consider promoting and adverse factors in the same analyses. Therefore, our aim was to examine the influence of both assumed promoting and assumed adverse factors in relation to self-reported school wellbeing. First, each factor was studied separately in crude analyses, with school wellbeing as the outcome variable. Next, the individual factors were studied in multivariable analyses adjusting for all the other variables.

Contributors to health symptoms (Study 2)

Perceived health influences daily life, but school related factors that may contribute to children's subjective health have not been extensively studied. In the present study our aim was to assess whether factors assumed to promote health and factors assumed to have adverse effects on health were associated with self-reported sadness, anxiety, stomach ache, and headache. Associations were studied both in crude and multivariable analyses.

Reports of victimization and associations with health symptoms (Study 3)

Numerous studies have shown strong relations between self-reported victimization and ill health. In the Nordic countries, schools as well as parents are engaged in children's welfare and there is a special concern about victimization and its effects. Nevertheless, there is little knowledge about informant agreement in reporting of victimization, and yet less knowledge on the relation between victimization as reported by different informants and children's health. In this study, our aim was firstly to explore the concordance in children's, teachers', and parents' reports of victimization, and secondly, to assess the prevalence of children's self-reported health complaints (sadness, anxiety, stomach ache, and headache) related to victimization as reported by the three sources of information.

Methodological considerations

The study population

The thesis is based on a convenience sample (Hulley et al. 2001b) of five schools in Møre and Romsdal County, Norway. Children, parents, and teachers from the five schools took part in the TfM project that was organized by the schools. The headmasters agreed to participate in two surveys that were set two years apart, and the current studies use data from the first survey that was carried out from May to June 2002. None of the subjects declined to take part in the survey.

Of the five schools, three had grades from 1 to 7, and two had grades from 1 to 10. Altogether 423 children were invited to take part; this included all children from four of the schools and children in grades 7-10 from the fifth school. Children in grades 1-6 in the fifth school were excluded because there was a lack of capacity to administer the questionnaire. The children were between seven and 16 years of age at the time of the study. One child moved before the data collection started, and three children were on sick leave during the study period. Thus, 419 (99%) children provided responses, and we received parent responses for 377 (89%) and teacher responses for 403 (95%) of the children.

Procedure and measures

The instrument used in the study, The School wellbeing questionnaire, consists of three questionnaires (forms): one for the children (School wellbeing – Student questionnaire, Appendix 1, Norwegian version, Appendix 2), one for their parents (School wellbeing – Parent questionnaire, Norwegian version, Appendix 3), and one for teachers (School wellbeing – Teacher questionnaire, Norwegian version, Appendix 4). The adults were asked questions that corresponded with the questions for the children, but they were

asked fewer questions than the children. The adults completed their questionnaires some days ahead of the children.

The data collection was administered by school nurses and headmasters. Most of the informants filled in the questionnaire themselves, but younger children and children who had problems with reading or writing were interviewed by the school nurses. Thus, 180 children in grades 1-4, 53 children in grades 5-7, and three children in grades 8-10 were interviewed by trained school nurses who used the questionnaire as a guide. Under the instruction of the school nurse or a trained teacher the remaining 183 children completed the questionnaires themselves during a lesson that was allocated to this task. The class advisor filled in the teachers' form of the questionnaire for each child, and at home, one of the parents filled in the parents' form of the questionnaire. The questionnaires from the different informants were connected by a specific code.

The questionnaires consisted of a combination of items that are assumed to promote children's wellbeing, and items that may be adversely associated with their wellbeing. Responses to the questions were ranked on ordinal scales, with four or five response options. Some of the items that were addressed in the questionnaire are more relevant for experiences in the classroom and some items are more relevant for recess. Factors assumed to adversely influence wellbeing included academic problems, disturbances in their work, being bothered during lessons, loneliness and victimization (being bullied). Among the variables assumed to promote wellbeing were enjoyment in doing school work, a feeling of receiving help and assistance when needed, and satisfaction with school work. In addition, supportiveness from friends, peers and teachers was assumed to promote wellbeing. The given responses were assumed to be relevant for the current school year.

The School wellbeing questionnaire

Validity

The first version of the questionnaire was developed by the writer of this thesis (AL) in 1995. AL used a reference group of experienced teachers where the structure of the

questionnaire and each item was discussed. We aimed at having precise and simple formulations (Cummings et al. 2001, Selltiz et al. 1976) that would easily be understood by the youngest (6-7 years) children in primary school, and at the same time the formulations should not be perceived as infantile by pupils in secondary school (14-16 years).

The functionality of the questionnaire was tested in a pilot study. First, in a small rural school with grades from 1 to 7, teachers and parents completed their respective forms of the questionnaire, and AL interviewed all children using the Student questionnaire (Norwegian version) as a guide. The children expressed that they felt comfortable with the questionnaire, and no child expressed problems with understanding the wording. Teachers and parents acknowledged that the questionnaire was clear and straightforward to fill in.

Subsequently, the same version of the instrument was used in several schools with altogether more than 300 children in grades from 1 to 10. Teachers and parents completed their respective forms of the questionnaire some days ahead of the children, and trained teachers instructed the children who filled in the questionnaire themselves. The questions were read aloud by the teacher in classes where this was needed because of reading capacity. All schools reported that the questionnaire was easy to use, in lower as well as in higher grades.

In 2002, as part of the TfM school project, minor revisions were made in the questionnaire after thorough discussions with a group of school nurses and a group of school headmasters. This time, the younger children were interviewed individually by trained school nurses in a separate and quiet room at school, and the older children completed the questionnaire themselves, supervised by trained teachers in a lesson that was allocated to this task. Afterwards, both school nurses and teachers reported that the questionnaire was easy to administer, and especially, the school nurses considered the instrument to give good support when they moved from one theme to another in the interviews. Also, the teachers and parents experienced that their respective forms of the questionnaire were easy to handle and complete.

Based on the total experiences with the questionnaire, we concluded that face validity as well as construct and content validity are likely to be good (Hulley et al. 2001a, Selltiz et al. 1976).

Reliability

The test-retest reliability (Selltiz et al. 1976) of the School wellbeing – Student questionnaire was assessed in another data set of school children in grades 3, 6, and 9 (Appendix 5). Of 179 eligible children, the questionnaire was completed by 154 (86%) children two times, three weeks apart. The test-retest reliability for the 49 ordinal questions was acceptable with 82% of the Spearman's rho coefficients ranging between 0.45 and 0.64 (mean rho=0.55), and all p-values <0.001. For the outcome variables used in this thesis, the coefficients were: school wellbeing rho .60, sadness rho .46, anxiety rho .51, stomach ache rho .50, and headache rho .53.

In constructing the questionnaire, we had no intention of making items that could be used in composite variables, for instance in scales. Our aim was rather to formulate questions that could measure discrete and unidimensional constructs. The variables used in the thesis are all single-item measures and internal consistency (Anastasi 1976, Cummings et al. 2001) cannot be assessed for one single item alone. Nevertheless, we did some ad hoc analyses of internal consistency for some relevant items in the data material mentioned above (Appendix 5). Our single-item measures of loneliness and school wellbeing may illustrate two examples. In combination with items from a well established and validated loneliness scale (Asher and Wheeler 1985), our original single-item measures showed acceptable item-to-total score correlations (.63 and .61, respectively), and the Cronbach's Alphas were also acceptable (.78 and .73, respectively).

The reliability testing, that showed acceptable results in the data material of children in grades 3, 6, and 9 (Appendix 5), may indicate that our findings (Studies 1-3) are likely to be trustworthy.

External validity

In additional analyses of the data material, several central variables demonstrated distributions across school grades that corresponded to the results of previous studies. The distribution of victimization across school grades (Fig 5), for instance, showed a similar decline as demonstrated by studies in Australia and many countries in Europe (Olweus 1993, Smith and Madsen 1999, Solberg et al. 2007, Whitney and Smith 1993). In addition, the children's self-reported prevalence of victimization showed similar strong and graded associations with health symptoms as demonstrated in multinational studies (Due et al. 2005).

The distribution of the somatic symptoms across school grades also corresponds to earlier results. Perceived pain in the stomach usually decreases throughout childhood and adolescence (Kristjánsdóttir 1996, Natvig et al. 1999), and this is in line with our findings (Fig 3). Headache, on the other hand, increases with age (Lewis 2007, Strine et al. 2006), and the same is seen in the distribution of headache across school grades in our data material (Fig 4). To our awareness, no previous study has provided data on perceived sadness or perceived anxiety across the school years. Our results showed, however, a decline for sadness (Fig 1) and an approximately even distribution for anxiety (Fig 2).

The correspondence of distributions across school grades seen in our material (additional analyses, Figures 1-5) with equivalent distributions presented in previous studies may indicate that our results could be generalized (Cummings et al. 2001, Selltiz et al. 1976) at least in part, to school children in other western countries.

Methodological choices

Self-reports and triangulation

As illustrated by large scale international studies (Due et al. 2005, Samdal et al. 1998, Aarø et al. 1986), self-reports are widely used to collect information among school children, and self-reports have shown reasonable reliability in assessing health in adolescence (Breidablik et al. 2008). Self-reports are known to be effective in giving

information that may be hidden for other people, such as a person's feelings or beliefs, perceptions, motivations, or dreams (Selltiz et al. 1976). In our studies, for example, children reported on somatic pain (stomach ache and headache) and on feelings (loneliness, sadness and anxiety), and the adults (teachers and parents) reported on their assumptions about the individual child's possible pain and feelings.

In some situations, informants may be unable to give the correct information or they may be reluctant to share their thoughts or experiences, and thus, a study may be influenced by random or systematic errors (Selltiz et al. 1976). To our awareness, there are no obvious systematic errors in completing the questionnaires, but there may be random errors, such as by chance responses or forgetting to fill in responses to some questions.

Aschenbach and colleagues (1987) suggested that to increase the quality of the findings in the assessment of children's behaviour and emotional problems, gathering information from different sources would be better than relying solely on the children's self-reports. In Study 3, children, teachers, and parents contributed with information on children's victimization caused by bullying. In accordance with Patton, this method may be termed source triangulation (Bratthall and Jørgensen 2002, Malterud 2003). The purpose of triangulation is to achieve more precise knowledge about the studied phenomenon or to enlighten the diversity of the phenomenon (Malterud 2003). Generally, methods of triangulation have received some criticism (Oppermann 2000, Thurmond 2001) because information from different sources may be difficult to compare. Moreover, research related to childhood and adolescence has not yet sufficiently assessed the validity of source triangulation in the work of bullying and victimization.

Single-item measures versus composite scores

Often in humanistic traditions, variables are composed of several items that may construct a scale. Sometimes the reported values on each item are summarized to one score, or the mean score, or indexes may be used. Factor analysis (Anastasi 1976, Selltiz et al. 1976) is another method, often employed in psychological research. Here

observable and countable variables are used to compose a latent unobservable variable, a so-called factor.

It is commonly believed that variables composed of several items are more trustworthy than single-item measures (Cummings et al. 2001). In diagnostic work employing test instruments, it is reasonable to rely on information from a number of questions (Anastasi 1976), but in assessing everyday experiences, global measures may be preferable (Scarpello and Campbell 1983, Wanous et al. 1997, Youngblut and Casper 1993). Reliability tests of single-item measures have shown acceptable results (Robins et al. 2001, Wanous and Hudy 2001, Youngblut and Casper 1993), and correlations between global one-items and well established scales are typically moderate to high (Nagy 2002, Scarpello and Campbell 1983, Wanous et al. 1997).

The variables that we used in the studies were all based on single questions (one item). Generally, the questions were global, for example; “At school (in class), do you feel that you get all the help that you need?” In answering, the children could chose among five alternatives ranging from never to always. The impact of one specific item (e.g. the question sited above) in multivariable analyses may be a helpful guide for clinical, pedagogical or strategic work. When a composite variable is used, the basis for giving advices on practical improvements may be less precise, as for instance when teacher support is represented by 12 items (DeSantis King et al. 2006).

It has been suggested that global single-item measures may be more inclusive and capture discrete elements that may be neglected in composite scales (Scarpello and Campbell 1983). Examples of evaluated single-item measures from the literature may include job satisfaction (Scarpello and Campbell 1983, Wanous et al. 1997), effectiveness of teaching (Wanous and Hudy 2001), quality of life (Youngblut and Casper 1993), and anxiety (Sagrestano et al. 2002, Youngblut and Casper 1993). These examples are in line with the global single-item measures used in our studies, for example: loneliness, health symptoms (sadness, anxiety, stomach ache and headache), and school wellbeing. Single-item measures are supposed to be more appropriate when the construct of interest is clear to the respondent, sufficiently narrow, and one-dimensional rather than multidimensional (Wanous and Hudy 2001).

We are not aware of studies that have assessed the validity of single-item measures compared to scales in childhood or adolescence. However, separate studies have reported a fairly similar prevalence of loneliness among children when the results were obtained by a single question or by a scale (Asher et al. 1984, Asher and Paquette 2003).

The choice of the highest score

For two of the assumed adverse variables in the thesis, we decided to choose the single item with the highest score among several items related to the same theme. This decision was theoretically based and included the variables “academic problems” and “victimization”. Academic problems were explored by four questions each linked to a certain subject (reading, writing, mathematics, and foreign language (English)), and each question had four response options: no problems, some problems, quite a few problems, and lots of problems. We aimed at assessing the distress of perceived academic problems, and assumed that having the highest possible score (lots of problems) in one subject could cause more distress for a child than having fewer problems in two or more subjects. Consequently, we suggested that the single highest score (the max score, one score only) was more adequate for our analyses than a sum score or the mean score. Others have also argued that substantial differences may be blurred in sum scores (Wanous et al. 1997).

Victimization was measured by three questions each linked to a specific type of bullying behaviour, and each with five response options indicating increasing frequency. In line with the considerations detailed above we assumed that children who perceived themselves as being victimized at a high frequency by one type of bullying behaviour could feel more distress than children who were victimized at low frequency by two or more types of bullying.

Concerning the choice of using the single highest score among several available scores, others have applied the same method in analyses of victimization (Solberg and Olweus 2003). However, we are not aware of studies that have tested empirically the theoretical assumption of choosing the single adverse item with the highest score among

several covering the same theme. For some constructs, we suppose that a composite index (e.g. sum, mean or factor) could reflect distress in an equal or better way.

The cross-sectional design

The three studies of the thesis have a cross-sectional design (Jekel et al. 1996), although in Study 3, the teachers and parents filled in the questionnaire before the children responded. The cross-sectional design allows us to report on associations (Rothman 2002), and in the logistic analyses, we demonstrated the strength of the relations between the covariates and the outcome measures.

In the interpretation of the findings, we thought it was reasonable to assume a temporal pattern despite the cross-sectional design of the studies. Thus, it appears more logical that an adverse factor may influence wellbeing or health than vice versa. Correspondingly, in the interpretation of findings related to the assumed promoting factors, it seems more reasonable that receiving necessary help from teachers may protect against (reduce the prevalence of) stomach ache (girls in Study 2) than vice versa. But as an example related to the last-mentioned association, it is also possible that children who never or seldom experience stomach pain may evaluate their academic situation more positively, including the experience of help from teachers.

Statistical analyses

In papers 1 and 2, we used proportional odds logistic regression (Kleinbaum and Klein 2002). This method employs the ordinal rank in the dependent variable, and assumes that the odds ratio will be identical for each category increase in the dependent variable. The model is expected to be more efficient than binary logistic regression (Ananth and Kleinbaum 1997) because we avoid the loss of information that would result from dichotomising the dependent variable (Ravichandran and Fitzmaurice 2008).

In paper 3, frequencies of victimization reported by different informants were compared by the marginal homogeneity test for paired ordinal data, and the concordance between informants was measured by cross-tables and Spearman's rho. We assessed the

reported frequencies of victimization in relation to prevalence of health symptoms by using the option “categorical variable” in binary logistic regression (SPSS) which presents estimates for associations on ordinal scales.

In the three studies, all tests were two-sided, and p-values <0.05 were considered significant. The statistical analyses were performed in SPSS for Windows (version 15 or 18 SPSS, Chicago, Illinois).

Confounding variables

In the analyses, we may have failed to include other variables that could have influenced the results. Parental support and perceived unfairness are typical examples. Support from parents has shown great impact on the scholastic pathway of adolescents (Englund et al. 2008), and in our studies, parental support with homework, for instance, could have influenced both the outcome (school wellbeing in Study 1, or health symptoms in Study 2) and exposure variables (e.g. children’s enjoyment with school work). Correspondingly, perceived unfairness has shown associations with present wellbeing (Samdal et al. 1998) as well as with impaired health functioning later in life (De Vogli et al. 2007). And if perceived unfairness at school were included in the analyses, it is possible that this variable could have had a confounding effect (Jekel et al. 1996, Rothman 2002).

Statistical interactions

In Study 1, we did ad hoc formal interaction tests (Jekel et al. 1996, Rothman 2002) for the items that differed by gender. Two of the four tests showed significant interactions; boys differed from girls regarding perceived enjoyment in their school work and regarding the perception of receiving necessary help from teachers. Boys who never/seldom perceived receiving necessary help showed lower school wellbeing than girls with corresponding perceptions, and boys who usually/always perceived receiving necessary help had higher score on school wellbeing than girls with the corresponding perceptions.

Ethics

In Norway, there is no formal agency for ethical approval of school surveys, and therefore, this survey was approved by the statutory School Collaborative Committees of each school. Parents and children were carefully informed about the school-based project. First, parents were informed about the survey at a school meeting that indicated the start of the project. Then, information letters signed by the headmaster and by the principal investigator (AL) were sent to all parents, describing the aims of the survey, and emphasising that participation was voluntary, and that the collected information was confidential. In each class, teachers informed the children in greater detail about the survey. Children/parents who did not want to participate were asked to notify their class advisor or headmaster. The collection of data was approved by The Norwegian Data Inspectorate.

Main results

Paper 1: Class experiences and school wellbeing

In crude analyses adjusting only for gender and grade, all the adverse factors (denoted restraining factors in this study) related to lessons and recess showed strong and negative associations with school wellbeing, and most of the promoting factors were strongly and positively associated with school wellbeing. The multivariable analyses showed some differences by gender. Among boys, factors related to academic work seemed to be highly important. Boys who enjoyed their school work or experienced to get necessary help from teachers were three to four times more likely to report better school wellbeing compared to boys who were dissatisfied with teacher support or school work. For girls, the relational experience of being bothered in class had a strong and negative impact on their school wellbeing. Thus, different factors may determine school wellbeing in boys and girls, but for both genders, factors related to class may be more important than factors related to recess.

Paper 2: Loneliness and health symptoms

The assumed adverse factors showed strong and positive associations with each of the four health symptoms (sadness, anxiety, stomach ache, and headache) in crude analyses adjusting for gender and grade, and some of the promoting factors were negatively related to the health symptoms. In multivariable analyses, loneliness turned out to be the single most important variable. Loneliness was strongly associated with sadness, anxiety, and headache, and in relation to stomach ache, loneliness was of borderline significance. Separate analyses by gender demonstrated somewhat different patterns. For both genders, loneliness was strongly related to sadness, but for girls, loneliness was also strongly related to anxiety and headache. In relation to anxiety, perceived academic problems were strongly associated with anxiety for boys, whereas for girls, being bothered in class was strongly associated with anxiety. On the other hand, regarding promoting factors,

girls who received necessary help from teachers reported lower prevalence of stomach ache.

Together, these findings suggest that perceived loneliness may be a powerful contributor to subjective health symptoms among school children, and that girls may be particularly prone to adverse effects of loneliness. Furthermore, academic experiences and insulting relational aspects in class may have different impact on ill health for the genders.

Paper 3: Reports of peer victimization and health symptoms

Children, teachers, and parents reported fairly similar proportions of peer victimization, but the informant concordance in reports of victimization was low to moderate. For the highest frequencies (weekly/daily) of victimization, reports showed variations from high proportions of discordance to complete agreement. On the other hand, for more than four of five children who reported never or seldom to be victimized, this was confirmed by the significant adults. Children's self-reported victimization was strongly associated with self-reported sadness, anxiety, stomach ache, and headache, such that higher frequencies of victimization were related to higher prevalence of health symptoms. Victimization reported by teachers or parents showed generally weaker associations with children's self-reported health symptoms, and only for anxiety there was a clear dose-related effect.

Altogether, the agreement in reporting victimization between children, teachers, or parents was low to moderate, and the associations of reported victimization with children's health symptoms varied substantially between informants.

Discussion

The school setting

In the three studies of the thesis, we assessed factors limited to the school setting. Our intention was to explore factors that can be changed or improved by school leaders and staff in collaboration with the children and their parents. It has been suggested that effects of the school environment may have an independent influence on children's wellbeing (Zullig et al. 2009). Nevertheless, we acknowledge that personal characteristics and experiences outside the school setting, as well as family characteristics, will also influence and determine the children's school wellbeing and health (Due et al. 2011). But the latter influential factors were defined as outside the scope of the thesis.

Promotion of school wellbeing and health

The importance of school wellbeing

School wellbeing or satisfaction with school may be a reliable marker for children's adjustment (Baker et al. 2003) and good health (Løhre 2010). Strong relations have been demonstrated between school satisfaction and personal adjustment, self-esteem, and clinical maladjustment; students who disliked school differed substantially from students with average or high satisfaction with school (Huebner and Gilman 2006). Therefore, there has been an increased focus on school-related factors that may influence children's wellbeing at school and health (Baker et al. 2003).

Contributors to school wellbeing and health symptoms

We used the same variables as possible explanatory factors for school wellbeing (Study 1) and for health symptoms (Study 2). The results showed that the variables had different

impact on school wellbeing and on health symptoms. This difference was not present in the crude analyses that adjusted only for gender and grade, but was highly evident in the multivariable analyses.

In the crude analyses, all the presumed adverse factors and most of the assumed promoting factors showed strong associations with the outcome measures of both school wellbeing and the health symptoms. However, in the multivariable analyses, promoting factors related to school work showed strong positive associations with school wellbeing. Children, and especially boys who enjoyed their schoolwork or perceived getting the help they needed from their teachers, had a higher prevalence of school wellbeing. Among the adverse factors, perceived victimization during recess (of borderline significance for boys) and the perception of being bothered in class (for girls) were related to a lower prevalence of school wellbeing.

Regarding the health symptoms as outcome measures, the variables assumed to promote good health showed little impact in the multivariable analyses. Only the perception of receiving necessary help from teachers was associated with lower prevalence of stomach ache in girls. Among the adverse factors, loneliness showed an exceptional position by being strongly associated with three of the four complaints: For both genders, the association was strong with sadness; for girls, there were also strong associations with anxiety and headache.

Few studies have employed the same variables to assess school wellbeing and health symptoms. However, one study has reported that students who experienced a high level of justice at school together with high support from teachers and peers had the highest prevalence of school satisfaction and lowest prevalence of health complaints (Takakura et al. 2005). The perception of high demands from teachers had, however, dissimilar impacts on health and wellbeing; the variable had a beneficial impact on school satisfaction, but was also associated with a higher prevalence of complaints (Takakura et al. 2005). This may imply that academic challenges can increase the school wellbeing for some children whereas such challenges lead to ill health among others (Gillander Gådin and Hammarström 2000, 2003). It is possible that pleasure in doing academic work and/or satisfaction with performed work can be of importance. As seen in our results, academic enjoyment was strongly associated with school wellbeing.

Experiences in the classroom versus during recess

In the multivariable analyses (Study 1 and Study 2), factors related to the classroom had a greater impact than factors related to recess. Among the classroom-related promoting factors, the perception of getting necessary help from teachers and enjoyment related to school work were strongly associated with school wellbeing. In addition, the perception of getting necessary help from teachers was associated with lower prevalence of stomach ache in girls. Among classroom-related adverse factors, perceived academic problems were associated with higher prevalence of anxiety among boys, whereas in girls, perceived harassment in class and the perception of being disturbed during work were associated with anxiety and headache, respectively. Further, loneliness appeared to be strongly associated with health symptoms, but this variable covers both recess and the class situation as the children were asked to report their perceived loneliness while at school.

The results above underline the key role of teachers. In Norway, it is mandatory by the school laws that academic work should be adjusted to the individual level of each child (Kunnskapsdepartementet 1998), and it is the teacher's responsibility to give appropriate assistance. Further, it is the responsibility of the school personnel to create good working conditions in class and to prevent harassment (Kunnskapsdepartementet 1998). The great importance of teacher support on children's health and wellbeing has been emphasized in several studies (Baker 2006, Bru et al. 1998, McNeely and Falci 2004, Randolph et al. 2010, Samdal et al. 1998, Verkuyten and Thijs 2002). Yet, it is not clear whether the dimension of caring or the dimension of academic support or combinations of these two give the best results. Bru and colleagues (1998) suggested that academic support may have a stronger association with health than does the dimension of caring.

Perceived victimization during recess was not associated with any of the health symptoms (Study 2) in the multivariable analyses. This is contrary to most studies that show strong relations between the experience of being bullied and ill health (Arseneault et al. 2010, Gini and Pozzoli 2009). However, a few studies have demonstrated an attenuated effect of victimization after multivariable adjustment (Samdal et al. 1998, Verkuyten and Thijs 2002). In those studies, like in our Study 2, teacher support may

have a possible influence. This suggestion is supported by results showing that vulnerable children with good relations to their teachers were better adjusted than vulnerable children without such good relations (Baker 2006).

Gender differences

Our results suggest that boys are more vulnerable than girls in the academic situation. We found a higher prevalence of anxiety among boys who experienced academic problems; we also found a lower prevalence of school wellbeing among boys who were not satisfied with the help they received from teachers. Some researchers have reported that too much homework and difficult tasks may have a negative influence on somatic health among early adolescent boys (Gillander Gådin and Hammarström 2000). The same researchers also suggested that an increase in teacher demands across a three year period may have a negative impact on boys but not on girls (Gillander Gådin and Hammarström 2003). The negative reactions among boys may partly be explained by boys' eagerness to compete with peers to achieve better results (Gillander Gådin and Hammarström 2000), and in this competition some boys win, while others may feel they are losers.

Corresponding to the lower prevalence of school wellbeing, boys who reported to experience a high load of academic problems and/or insufficient help from teachers may feel unsuccessful and beaten by their classmates. Girls may have a higher tendency to comfort and help their classmates, and they may also take more initiative to ask questions when they do not understand a task (Gillander Gådin and Hammarström 2000). Further, compared to boys, the girls may experience higher supportiveness from the school and from teachers (Gest et al. 2005, Konu and Lintonen 2006b).

In our results, the relational aspect of being together with peers seems to be more important for girls than for boys. Generally, girls were more prone to adverse effects of loneliness; they also tended to be more vulnerable than boys when they were bothered in class. For girls, such harassment was strongly related to anxiety and to lower prevalence of school wellbeing. In addition, we found a higher prevalence of headache in girls who experienced being disturbed by peers in carrying out their schoolwork. For boys, perceived harassment in class and disturbed work were not related to any outcome

measures. These gender differences may possibly, and partly, be explained by relatively higher maladaptive coping with interpersonal stressors among girls (Hampel et al. 2008), and lower levels of positive thinking and higher scores on negative problem orientation (Calvete and Cardenoso 2005). Generally, negative self-perception may predict relational problems and negative perception of others (Salmivalli and Isaacs 2005).

Concordance among informants

In reports of victimization, children, teachers and parents demonstrated low to moderate agreement (Study 3). Corresponding agreement has been reported in other studies of victimization (Holt et al. 2009, Ladd and Kochenderfer-Ladd 2002). One study called attention to the need for regular communication to increase agreement between children and significant adults (Fekkes et al. 2005), but actually, we do not know whether increased agreement will reduce victimization or lessen the burdens related to victimization.

The importance of concordance between children and significant adults has barely been explored, and there is a need for research that assesses possible consequences of low or higher concordance on different topics related to children's wellbeing and health. Theoretically, it is possible that agreement is more essential on some topics than on others. In relation to quality of life, it has been argued that somewhat different opinions from children and significant adults may be positive because in combination, the different perspectives will broaden the knowledge on children's quality of life (Jozefiak et al. 2008). This is in line with qualitative research that seeks to get a comprehensive picture of the study phenomenon by gathering information from different sources (Malterud 2003).

On the other hand, when related to some special topics the highest possible agreement will be welcomed, and suicidal ideation among young people may be an illustrative example (De Los Reyes and Kazdin 2005). Further, sometimes additional factors in the situation may be of great significance, and dissimilar situations may require different degrees of agreement. This may be so for children's school wellbeing. Under some circumstances, school wellbeing may be compared to quality of life and a

comprehensive picture of different aspects could be appreciated (Konu and Rimpela 2002), but in other situations, distinct or global expressions of school wellbeing may be preferred (Løhre 2010). It is obvious that some pupils have bad feelings connected to school (Huebner and Gilman 2006), and such emotions may escalate to hatred. Hopefully, insight at an early stage may stop a negative cycle, and used for this purpose, triangulation of information from several significant sources could possibly provide a basis for involvement and practical improvements.

To conclude, and as stated by others, the choice of using source triangulation has to be guided by the research question (Malterud 2003). In some studies, the aim is to get a consensus or a comprehensive picture of the situation from different perspectives (Jozefiak et al. 2008, Kraemer et al. 2003, Perren and Alsaker 2006), and in other studies, the aim may be to verify results or to increase or decrease the confidence in a finding (Bratthall and Jørgensen 2002, Oppermann 2000). Another option may be the aim of mapping concordance, like we did in Study 3, to assess associations with essential concurrent or future outcome measures or to assess possible precursors of the degree of agreement.

Challenges and possibilities

In our results, academic distress, loneliness, and victimization appeared to be adverse factors with a negative impact on school wellbeing or health symptoms. It is a challenge for all schools to prevent hurtful experiences among the children and to diminish subsequent effects of adverse experiences.

Academic distress may include perceived academic problems, disturbances at work, and harassment from classmates (Study 1 and Study 2). Previous studies have shown the impact of such distress on wellbeing and health (Heath and Ross 2000, Nowicki 2003, Samdal et al. 1998, Wiener and Schneider 2002, Aarø et al. 1986). On the other hand, prosocial behaviour may reduce academic distress among the school children (Bandura et al. 1996, Caprara et al. 2000). This point of view was strengthened by the work of Catalano and colleagues (2004) when they found that academic achievement was improved after an intervention that aimed to increase school bonding.

In line with our results (Study 2), loneliness has shown a great impact on the symptom load in childhood and adolescence (Rayce et al. 2009, Rotenberg and Hymel 1999). Loneliness may be part of a negative feedback loop with passivity; loneliness may be related to shyness (Stoeckli 2009), and shyness may have an impact on passivity (Paulsen et al. 2006), and as suggested by Stoeckli (2009) passivity may indirectly be related to loneliness.

Thus, in the prevention of loneliness, Stoeckli proposed to work with participation in the classroom instead of working directly with children's loneliness (Stoeckli 2009). This strategy may be supported by a study that reported a negative association of loneliness with children's competence and support from others (Paulsen et al. 2006). Further, a cross-national study among adolescents in Europe showed that students who were socially well integrated at school had better health (Eder 1990), and in another study, loneliness was negatively associated with school belongingness (Baskin et al. 2010). It is also possible that participation in the classroom may increase children's belongingness at school (Catalano et al. 2004). In any case, loneliness was reduced among the children after strengthening school bonding in an intervention study (Catalano et al. 2004).

Regarding victimization, our results showed a negative association with school wellbeing (Study 1) and with health symptoms in analyses adjusting only for gender and grade (Study 2 and Study 3), but in the multivariable analyses (Study 2) there were no significant associations of victimization with health complaints. However, other studies have shown strong relations between victimization and ill health (Arseneault et al. 2010, Gini and Pozzoli 2009, Hawker and Boulton 2000), and bullying is of major concern among parents and the school staff (Zeedyk et al. 2003). All the same, most school based intervention programs to prevent bullying and victimization have shown little effect on the bullying behaviour or outcomes related to bullying (Merrell et al. 2008, Vreeman and Carroll 2007).

Bullying and victimization have been described as relational problems (Craig and Pepler 2003, Pepler et al. 2006), and as stated by Debra J. Pepler; "A relational problem requires relationship solutions" (Pepler et al. 2006, p. 17) . The social context appears to be important, as in some classes, there may not be anyone who experiences being

victimized whereas in other classes, more than half the children may report being victimized (Atria et al. 2007, Mahdavi and Smith 2007). In the classroom, the teacher has a central position, and the teacher's management of the class has shown strong relations to involvement in bullying (Roland and Galloway 2002). It has also been suggested that support from others may reduce the harmful effects of victimization (Davidson and Demaray 2007), and it has been recommended that adults in school should create social contexts that may promote positive interactions among peers (Pepler et al. 2006). Further, it has been suggested that peer support models may contribute in attitudes towards peers and in everyday interactions (Cowie 2000, Cowie et al. 2002, Menesini et al. 2003).

To summarize, based on the literature, it seems that the adverse factors used in our studies – academic distress, loneliness, and victimization – or the effect of these factors, may be diminished by the same intervention principles. Systematic work to support participation and competence, to increase prosocial behaviour, and to improve relationships may be useful elements in strengthening children's belongingness to school. Our results underline the essential role of the teacher; the teacher's involvement in children's academic work was associated with higher prevalence of school wellbeing and lower prevalence of health complaints (stomach ache among girls). This indicates a great possibility for schools whose aim is to improve wellbeing and reduce health complaints.

Strengths and limitations

The studies were conducted in public schools in rural communities, ranging from inland to coastal areas. The population base and the very high attendance are strengths of the studies, but it is a weakness that children from urban settings were not included. In the data collection, younger children were interviewed by school nurses, whereas older children completed the questionnaire themselves. Although the nurses were trained for this task, we cannot exclude the possibility that the different procedures could have influenced the responders and introduced systematic differences in results between younger and older children.

Nevertheless, some essential variables that we used in the studies showed results comparable to those seen in international studies (e.g. distributions across school grades

showed in Figures 1-5, and associations), and this may indicate that external validity may be acceptable and that our results, at least in part, may be generalized to other western school communities.

However, the cross-sectional design is a limitation of the studies. Simultaneous reports of assumed adverse/promoting factors and outcome measures may lead to inter-related responses to the questions, and this could have caused stronger associations between explanatory factors and outcomes. Thus, applying outcomes subsequent to the initial collection of data could have yielded different results. Therefore, the findings should be interpreted with caution, since cross sectional designs limit the possibility to study causal effects.

Conclusions

Among the factors that we assumed to have adverse effects on school wellbeing or health symptoms, every variable appeared to act as an adverse factor. In crude analyses adjusting for gender and grade, all factors were strongly and negatively associated with school wellbeing (Study 1), and the same factors were strongly and positively associated with sadness, anxiety, stomach ache and headache (Study 2, and Study 3). However, in the multivariable analyses, most of the associations were fully attenuated, and loneliness was the only variable that showed a particular impact. Loneliness was strongly related to both the emotional and somatic symptoms, and girls seemed to be especially prone to adverse effects of loneliness (Study 2).

On the other hand, most of the factors that we assumed to have promoting effects on the outcome measures, appeared to act as promoting factors in the crude analyses adjusting for gender and grade (Study 1, and Study 2). In the multivariable analyses, some of those associations were attenuated, and factors related to the school class seemed to be of the greatest importance. Children, particularly boys, who felt enjoyment in doing their school work and/or experienced to get the necessary help from teachers, were likely to have higher prevalence of school wellbeing, and girls who were satisfied with the teachers' help in class showed lower prevalence of stomach ache.

The triangulation of sources in reports of victimization revealed a complex picture. The agreement between children, teachers and parents in reports of victimization was low to moderate. Children's self-reports of victimization and health symptoms were strongly related, and the gradient was clear; the more often the child experienced being victimized, the higher was the prevalence of health symptoms. Teachers' or parents' reports of assumed victimization showed weaker associations with the health symptoms reported by the children, and the reports on victimization from the significant adults showed a clear gradient only with anxiety.

Our results point to implications both for the clinical fields (school and health systems) and the research fields.

Implications for schools and health care

Our results underline the key role of teachers. The art of teaching and the teacher's involvement with the children appear to be health promoting. Schools need to ensure that every child experiences enjoyment with his or her school work, and further, schools need to ensure that each child perceives satisfaction with the help they receive from teachers in class. Schools that succeed with those academic tasks are likely to have pupils who experience better school wellbeing and fewer health complaints.

Next, the schools have an important challenge in preventing loneliness among the children. A reduction of loneliness may be associated with better health outcomes and thus act as a health promoting strategy. In this work, teachers' strategic planning for students' participation in class and their involvement with the children may be of high significance. Clinicians in the school systems or in health care need to know about possible factors in the school setting that may be associated with health symptoms and wellbeing among the children, and particularly, they need to be aware of the possibly strong relation between loneliness and health symptoms.

Incentives for further research

There is a lack of studies that assess promoting factors in the school setting. With our results and previous literature as a background, we suggest that future research needs to go more deeply into children's interpersonal relationships, prosocial behaviour, and participation in the classroom.

Further, there is a need to assess teacher support in more detail. We asked the children to what degree they perceived getting the necessary help in the classroom. This question needs to be specified and divided into academic assistance and caring attention. In addition, questions should include an aspect of perceived justice. Previous studies have shown that perceived fairness and justice may be essential for the students, and therefore we suggest that this aspect be studied in relation to academic help and a caring kind of attention.

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Appendix

Appendix 1: School wellbeing – Student questionnaire

Appendix 2: Skoletrivsel – elevskjema

Appendix 3: Skoletrivsel – foreldreskjema

Appendix 4: Skoletrivsel – lærerskjema

Appendix 5: Reliability testing

Appendix 1

School wellbeing – Student questionnaire

School: _____ Grade: _____ Number _____
Year: _____ spring
autumn girl
 boy

We want to know how you feel about this school year. Put an x in the box that best describes you.

Class and recess

1. Which do you like best:

class recess like both equally well

2. What do you do during recess?

3. What do you like about recess?

4. How much do you like recess?

not at all not much so-so fine very much

5. Do you have good friends at school?

none one good friend 2-3 good friends 4-5 good friends many good friends

6. Do you look forward to class?

never seldom sometimes usually almost always

Subjects

7. How much do you like schoolwork?

not at all	not much	so-so	fine	very much
<input type="checkbox"/>				

8. Do you have problems with any of these subjects:

	no problems	some problems	quite a few problems	lots of problems
reading	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
writing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
mathematics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
foreign language (English)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P.E.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. Do you feel that you get all the help that you need:

	no, never	seldom	sometimes	usually	yes, always
at school (in class)	<input type="checkbox"/>				
with homework	<input type="checkbox"/>				

10. Do you find the necessary peace to work well:

	no, never	seldom	sometimes	usually	yes, always
at school (in class)	<input type="checkbox"/>				
with homework	<input type="checkbox"/>				

11. How pleased are you with your own work:

	not at all	not much	so-so	fine	very much
at school (in class)	<input type="checkbox"/>				
with homework	<input type="checkbox"/>				

Loneliness

12. What does it mean to be lonely?

13. Do you ever see students at school who seem to be lonely?

never	seldom	sometimes	about every week	about every day
<input type="checkbox"/>				

14. What do you usually do if someone you know at school seems lonely?

You may mark one or two boxes:

- don't do anything because I'm busy with my own activities
- don't do anything because I don't dare
- don't do anything because it's not my problem
- go over and talk with the student
- ask the student to join in with the others

15. What do you think other students should do when they see someone who seems lonely?

You may mark one or two boxes:

- nothing
- go over and talk with the student
- ask the student to join in with the others

16. What do you think teachers should do when students seem to be lonely?

Explain:

17. What about you, do you ever feel lonely at school?

never	seldom	sometimes	about every week	about every day
<input type="checkbox"/>				

If you never feel lonely, go to question 19.

18. Who can you ask for help when you feel lonely?

You may mark one or more boxes:

- classmates
- older students
- younger students
- teachers/other adults
- no one

19. Did you ever feel lonely before the start of this school year?

	never	seldom	sometimes	about every week	about every day
pre-school years	<input type="checkbox"/>				
previous grades	<input type="checkbox"/>				

Bullying

20. Do you ever see students who are teased or bothered during recess?

	never	seldom	sometimes	about every week	about every day
	<input type="checkbox"/>				

21. What do you usually do when a student is teased or bothered?

You may mark one or more boxes:

- don't do anything because I'm busy with my own activities
- don't do anything because I don't dare
- don't do anything because it's not my problem
- tell the bullies to stop
- get adults
- tell the teachers later
- tell my parents

22. What do you think other students should do when someone is teased or bothered?

You may mark one or two boxes:

- nothing
- tell the bullies to stop
- get adults
- tell the teachers later
- tell their parents

23. What do you think teachers should do when students are teased or bothered?

Explain:

24. Are you bothered in some way that makes you feel bad?

	never	seldom	sometimes	about every week	about every day
to and from school					
teased	<input type="checkbox"/>				
hit, kicked, pushed	<input type="checkbox"/>				
left out, excluded	<input type="checkbox"/>				
during recess					
teased	<input type="checkbox"/>				
hit, kicked, pushed	<input type="checkbox"/>				
left out, excluded	<input type="checkbox"/>				
bothered in class	<input type="checkbox"/>				

If you are bothered in class, explain how:

If you are never bothered, go to question 28.

25. Who teases or bothers you during recess?

You may mark one or more boxes:

- classmates
- older students
- younger students
- teachers
- other adults

26. Who comes and helps you when someone has bothered you?

You may mark one or more boxes:

- classmates
- older students
- younger students
- teachers
- other adults
- no one

27. Who can you ask for help when you have been teased or bothered?

You may mark one or more boxes:

- classmates
- older students
- younger students
- teachers/other adults
- no one

28. Were you ever teased or bothered before the start of this school year?

	never	seldom	sometimes	about every week	about every day
pre-school years	<input type="checkbox"/>				
previous grades	<input type="checkbox"/>				

29. Do you ever bother others on purpose (intentionally):

	never	seldom	sometimes	about every week	about every day
tease	<input type="checkbox"/>				
hit, kick, push	<input type="checkbox"/>				
shut out, exclude	<input type="checkbox"/>				

Wellbeing and mood

30. What kind of mood have you been in lately?

- | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|
| very bad | not so good | good | very good |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

31. How have you felt lately? How often have you:

	never	seldom	sometimes	often	always
been happy	<input type="checkbox"/>				
been sad	<input type="checkbox"/>				
felt safe	<input type="checkbox"/>				
felt anxious	<input type="checkbox"/>				
had a stomach ache	<input type="checkbox"/>				
had a head ache	<input type="checkbox"/>				
had other problems	<input type="checkbox"/>				

32. Do you dread recess?

never seldom sometimes often almost always

33. Do you dread classroom time?

never seldom sometimes often almost always

34. Who can you talk to if something hurtful or difficult happens to you:

	no, never	maybe	probably	certainly
other students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
class advisor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
other teachers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
my parents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
other adults	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
no one	<input type="checkbox"/>			

35. How do you like it at school?

very bad not so good good very good

36. Explain why you feel this way about school:

37. Think about a fantastic recess. What would you like to be doing then?

Explain:

Appendix 2

Skoletrivsel – elevskjema

Skole: _____
År: _____

V Klasse: _____
H

Løpenr. _____
 jente
 gutt

Vi vil gjerne vite hvordan du trives **dette skoleåret**. Sett kryss for det som passer best for deg.

Timer og friminutt

1. Hva liker du best av timer og friminutt?

timene

friminutta

liker begge deler godt

2. Hva gjør du i friminutta?

3. Hva synes du er bra med friminutta?

4. Hvordan trives du i friminutta?

svært dårlig

dårlig

sånn passe

godt

kjempegodt

5. Har du gode venner på skolen?

ingen

en god
venn

2 - 3 gode
venner

4 - 5 gode
venner

flere gode
venner

6. Gleder du deg til timene?

aldri

sjelden

av og til

som oftest

nesten alltid

Skolefag

7. Hvordan liker du skolearbeidet?

svært dårlig dårlig sånn passe godt kjempegodt

8. Har du problemer med noen av disse fagene:

	ingen problemer	små problemer	store problemer	svært store problemer
lesing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
skrivning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
matematikk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
engelsk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
gymnastikk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. Synes du selv at du får den hjelpa du trenger:

	nei, aldri	sjelden	av og til	som oftest	ja, alltid
på skolen	<input type="checkbox"/>				
heime med lekser	<input type="checkbox"/>				

10. Får du den arbeidsroa du trenger:

	nei, aldri	sjelden	av og til	som oftest	ja, alltid
på skolen	<input type="checkbox"/>				
heime	<input type="checkbox"/>				

11. Hvor fornøyd er du med det du gjør:

	svært dårlig	dårlig	sånn passe	godt	kjempegodt
på skolen	<input type="checkbox"/>				
med lekser heime	<input type="checkbox"/>				

Ensomhet

12. Hva betyr det å være ensom?

13. Ser du elever som virker ensom på skolen?

aldri	sjelden	av og til	omtrent hver uke	omtrent hver dag
<input type="checkbox"/>				

14. Hva gjør du vanligvis når en elev du kjenner virker ensom?

Her kan du sette ett eller to kryss:

- gjør ingenting med det, fordi jeg er opptatt med egne aktiviteter
- gjør ingenting med det, fordi jeg ikke tør
- gjør ingenting med det, fordi det ikke er mitt problem
- går bort og prater med eleven
- ber eleven bli med sammen med andre

15. Hva synes du andre elever bør gjøre når noen virker ensom?

Her kan du sette ett eller to kryss:

- ingenting
- gå bort og prate med eleven
- be eleven bli med sammen med de andre

16. Hva synes du lærerne bør gjøre når elever virker ensomme?

Fortell:

17. Enn du da, føler *du* deg ensom på skolen?

aldri	sjelden	av og til	omtrent hver uke	omtrent hver dag
<input type="checkbox"/>				

Den som **aldri** føler seg ensom, går til spørsmål 19.

18. Hvem kan du søke hjelp hos når du føler deg ensom?

Her kan du sette ett eller flere kryss:

- klassekamerater
- eldre elever
- yngre elever
- lærere / andre voksne
- ingen

19. Har du kjent deg ensom før dette skoleåret starta:

	aldri	sjelden	av og til	omtrent hver uke	omtrent hver dag
i åra før 1. klasse	<input type="checkbox"/>				
tidligere skoleår	<input type="checkbox"/>				

Plaging

20. Ser du elever som blir erta og plaga i friminutta?

	aldri	sjelden	av og til	omtrent hver uke	omtrent hver dag
	<input type="checkbox"/>				

21. Hva gjør du vanligvis når en elev blir erta og plaga?

Her kan du sette ett eller flere kryss:

- gjør ingenting med det, fordi jeg er opptatt med egne aktiviteter
- gjør ingenting med det, fordi jeg ikke tør
- gjør ingenting med det, fordi det ikke er mitt problem
- ber plagerne om å holde opp
- henter voksne
- sier fra til lærerne etterpå
- sier fra til foreldrene mine

22. Hva synes du andre elever bør gjøre når noen blir erta og plaga?

Her kan du sette ett eller flere kryss:

- ingenting
- be plagerne om å holde opp
- gå å hente voksne
- si fra til lærerne etterpå
- si fra til foreldrene sine

23. Hva synes du lærerne bør gjøre når elever blir erta og plaga?

Fortell:

24. Blir du plaget på en sårn måte at du føler det ubehagelig:

	aldri	sjelden	av og til	omtrent hver uke	omtrent hver dag
på skoleveien					
Blir erta	<input type="checkbox"/>				
Blir slått, sparka, dytta	<input type="checkbox"/>				
Blir utestengt og får ikke være med de andre	<input type="checkbox"/>				
i friminutta					
Blir erta	<input type="checkbox"/>				
Blir slått, sparka, dytta	<input type="checkbox"/>				
Blir utestengt og får ikke være med de andre	<input type="checkbox"/>				
blir plaget i timene	<input type="checkbox"/>				

Hvis du blir plaget i timene,
så fortell hvordan:

Den som **aldri** blir plaget, går til spørsmål 28.

25. Hvem er det som ertes og plager deg i friminutta?

Her kan du sette ett eller flere kryss:

- klassekamerater
- eldre elever
- yngre elever
- lærere
- andre voksne

26. Hvem kommer og hjelper deg når du blir plaget?

Her kan du sette ett eller flere kryss:

- klassekamerater
- eldre elever
- yngre elever
- lærere
- andre voksne
- ingen

27. Hvem kan du selv søke hjelp hos når du blir erta og plaga?

Her kan du sette ett eller flere kryss:

- klassekamerater
- eldre elever
- yngre elever
- lærere / andre voksne
- ingen

28. Har du vært erta og plaga før dette skoleåret starta:

	aldri	sjelden	av og til	omtrent hver uke	omtrent hver dag
i åra før 1. klasse	<input type="checkbox"/>				
tidligere skoleår	<input type="checkbox"/>				

29. Hender det at du plager andre med vilje:

	aldri	sjelden	av og til	omtrent hver uke	omtrent hver dag
erter	<input type="checkbox"/>				
slår, sparker, dytter	<input type="checkbox"/>				
holder andre utafor	<input type="checkbox"/>				

Trivsel og humør

30. Hvordan har humøret ditt vært den siste tida?

veldig dårlig	ikke så bra	godt	kjempegodt
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

31. Hvordan har du hatt det den siste tida? Hvor ofte har du:

	aldri	sjelden	av og til	veldig ofte	hele tida
vært glad	<input type="checkbox"/>				
vært trist	<input type="checkbox"/>				
følt deg trygg	<input type="checkbox"/>				
vært engstelig	<input type="checkbox"/>				
hatt vondt i magen	<input type="checkbox"/>				
hatt vondt i hodet	<input type="checkbox"/>				
hatt andre plager	<input type="checkbox"/>				

32. Gruer du deg til friminutta?

aldri sjelden av og til som oftest nesten alltid

33. Gruer du deg til timene?

aldri sjelden av og til som oftest nesten alltid

34. Hvem kan du snakke med hvis noe vondt eller vanskelig skulle hende :

	nei, aldri	kanskje	sannsynligvis	helt sikkert
andre elever	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
klassestyrer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
andre lærere	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
foreldrene mine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
andre voksne	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ingen	<input type="checkbox"/>			

35. Hvordan trives du på skolen?

veldig dårlig ikke så bra godt kjempegodt

36. Fortell hvorfor du trives som du gjør på skolen:

37. Tenk deg et super-fint friminutt. Hva ville du helst holde på med da?

Fortell:

Appendix 3

Skoletrivsel – foreldreskjema

Skole: _____
V Klasse: ____
År: _____ H

Løpenr. ____
 jente
 gutt

Vi vil gjerne vite mer om elevenes trivsel **dette skoleåret**. Sett kryss for det du mener passer best for datteren/sønnen din.

Timer og friminutt

1. Datteren/sønnen min trives:

	svært dårlig	dårlig	sånn passe	godt	kjempegodt
i friminutta	<input type="checkbox"/>				
i timene	<input type="checkbox"/>				

2. Datteren/sønnen min har gode venner på skolen:

ingen	en god venn	2 - 3 gode venner	4 - 5 gode venner	flere gode venner
<input type="checkbox"/>				

Skolefag

3. Datteren/sønnen min liker skolearbeidet:

svært dårlig	dårlig	sånn passe	godt	kjempegodt
<input type="checkbox"/>				

4. Datteren/sønnen min har problemer med disse fagene:

	ingen problemer	små problemer	store problemer	svært store problemer
lesing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
skrivning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
matematikk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
engelsk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
gymnastikk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. Datteren/sønnen min får den hjelpa hun/han trenger:

	nei, aldri	sjelden	noen ganger	som oftest	ja, alltid
på skolen	<input type="checkbox"/>				
heime med lekser	<input type="checkbox"/>				

6. Datteren/sønnen min får du den arbeidsroa hun/han trenger:

	nei, aldri	sjelden	noen ganger	som oftest	ja, alltid
på skolen	<input type="checkbox"/>				
heime	<input type="checkbox"/>				

7. Datteren/sønnen min er fornøyd med det hun/han gjør:

	svært dårlig	dårlig	sånn passe	godt	kjempegodt
på skolen	<input type="checkbox"/>				
heime med lekser	<input type="checkbox"/>				

Ensomhet

8. Noen elever føler seg ensom på skolen. Hva synes du andre elever bør gjøre når noen virker ensom?

Her kan du sette ett eller to kryss:

- ingenting
- gå bort og prate med eleven
- be eleven bli med sammen med andre

9. Hva synes du lærerne bør gjøre når elever virker ensom?

Fortell:

10. Datteren/sønnen min føler seg ensom på skolen:

	aldri	sjelden	av og til	omtrent hver uke	omtrent hver dag
	<input type="checkbox"/>				

11. Datteren/sønnen min forteller meg om:

	aldri	sjelden	av og til	omtrent hver uke	omtrent hver dag
opplevd ensomhet	<input type="checkbox"/>				

Foreldre som **aldri** hører om opplevd ensomhet hos datteren/sønnen, går til spørsmål 13.

12. Hva gjør du når datteren/sønnen din forteller at hun/han føler seg ensom på skolen?

Her kan du sette ett eller flere kryss:

- ingenting
- snakker med datteren/sønnen min om det
- tar det opp med klassestyrer
- snakker med andre foreldre for å be om råd
- annet, fortell:

13. Hva vil du gjøre hvis du senere får høre om andre elever som føler seg ensom?

Her kan du sette ett eller flere kryss:

- ingenting, fordi det ikke er mitt problem
- ingenting, fordi jeg ikke ønsker å blande meg borti
- be datteren/sønnen min om å være mer sammen med eleven
- kontakte foreldra til eleven og snakke med dem om hva som kan gjøres
- kontakte klassestyrer for å drøfte hva vi foreldre kan gjøre
- annet, fortell:

Plaging

14. Noen elever blir erta og plaga på skolen. Hva synes du andre elever bør gjøre når noen blir erta og plaga?

Her kan du sette ett eller flere kryss:

- ingenting
- be plagerne om å holde opp
- hente voksne
- si fra til lærerne etterpå
- si fra til foreldrene sine

15. Hva synes du lærerne bør gjøre når elever blir erta og plaga?

Fortell:

16. Datteren/sønnen min opplever å bli erta og plaga:

	aldri	sjelden	av og til	omtrent hver uke	omtrent hver dag
på skoleveien	<input type="checkbox"/>				
i friminutta	<input type="checkbox"/>				
i timene	<input type="checkbox"/>				

17. Datteren/sønnen min opplever å bli utestengt slik at hun/han ikke får være med de andre:

	aldri	sjelden	av og til	omtrent hver uke	omtrent hver dag
	<input type="checkbox"/>				

18. Datteren/sønnen min forteller meg om:

	aldri	sjelden	av og til	omtrent hver uke	omtrent hver dag
opplevd plaging/erting	<input type="checkbox"/>				
opplevd utestenging	<input type="checkbox"/>				

Foreldre som **aldri** hører om opplevd plaging/erting eller utestenging hos datteren/sønnen, går til spørsmål 20.

19. Hva gjør du når datteren/sønnen din forteller at hun/han blir erta/plaga eller utestengt på skolen?

Her kan du sette ett eller flere kryss:

- ingenting
- snakker med datteren/sønnen min om det
- ta det opp med klassestyrer
- snakke med andre foreldre for å be om råd
- annet, fortell:

20. Hva vil du gjøre hvis du senere får høre om elever som blir erta/plaga eller utestengt på skolen?

Her kan du sette ett eller flere kryss:

- ingenting, fordi det ikke er mitt problem
- ingenting, fordi jeg ikke ønsker å blande meg borti
- be datteren/sønnen min om å ta det opp på skolen
- kontakte foreldra til eleven og snakke med dem om hva som kan gjøres
- kontakte klassestyrer for å drøfte hva vi foreldre kan gjøre

21. Datteren/sønnen min plager andre:

	aldri	sjelden	av og til	omtrent hver uke	omtrent hver dag
erter	<input type="checkbox"/>				
slår, sparker, dytter	<input type="checkbox"/>				
holder andre utafor	<input type="checkbox"/>				

Trivsel og humør

22. Humøret til datteren/sønnen min er:

Her skal du sette ett kryss, enten i rekka for stabilt eller i rekka for ustabilt.

	svært dårlig	dårlig	verken godt eller dårlig	godt	svært godt
stabilt	<input type="checkbox"/>				
ustabilt	<input type="checkbox"/>				

23. Datteren/sønnen min viser:

	aldri	sjelden	av og til	som oftest	nesten alltid
glede over sosial kontakt med medelever	<input type="checkbox"/>				
glede over mestring i skolearbeidet	<input type="checkbox"/>				

24. Datteren/sønnen min virker:

	aldri	sjelden	av og til	veldig ofte	hele tida
glad	<input type="checkbox"/>				
trist	<input type="checkbox"/>				
trygg	<input type="checkbox"/>				
engstelig	<input type="checkbox"/>				
annet, fortell:					

25. Datteren/sønnen min gruer seg til:

	aldri	sjelden	av og til	som oftest	nesten alltid
friminutta	<input type="checkbox"/>				
timene	<input type="checkbox"/>				

26. På skolen trives datteren/sønnen min samla sett:

veldig dårlig	<input type="checkbox"/>	ikke så bra	<input type="checkbox"/>	godt	<input type="checkbox"/>	kjempegodt	<input type="checkbox"/>
---------------	--------------------------	-------------	--------------------------	------	--------------------------	------------	--------------------------

27. Tilleggsopplysninger som kan ha betydning for trivselen:

Appendix 4

Skoletrivsel – lærerskjema

Skole: _____
V Klasse: _____
H År: _____

Løpenr. _____
 jente
 gutt

*Vi vil gjerne vite mer om elevenes trivsel **dette skoleåret**. Sett kryss for det du mener passer best for denne eleven.*

Timer og friminutt

1. Denne eleven trives:

	svært dårlig	dårlig	sånn passe	godt	kjempegodt
i friminutta	<input type="checkbox"/>				
i timene	<input type="checkbox"/>				

2. Denne eleven har gode venner på skolen:

	ingen	en god venn	2 - 3 gode venner	4 - 5 gode venner	flere gode venner
	<input type="checkbox"/>				

Skolefag

3. Denne eleven liker skolearbeidet:

	svært dårlig	dårlig	sånn passe	godt	kjempegodt
	<input type="checkbox"/>				

4. Denne eleven har problemer med disse fagene:

	ingen problemer	små problemer	store problemer	svært store problemer
lesing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
skrivning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
matematikk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
engelsk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
gymnastikk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. Denne eleven får den hjelpa hun/han trenger:

	nei, aldri	sjelden	noen ganger	som oftest	ja, alltid
på skolen	<input type="checkbox"/>				
heime med lekser	<input type="checkbox"/>				

6. Denne eleven får den arbeidsroa hun/han trenger:

	nei, aldri	sjelden	noen ganger	som oftest	ja, alltid
på skolen	<input type="checkbox"/>				
heime	<input type="checkbox"/>				

7. Denne eleven er fornøyd med det hun/han gjør:

	svært dårlig	dårlig	sånn passe	godt	kjempegodt
på skolen	<input type="checkbox"/>				
heime med lekser	<input type="checkbox"/>				

Ensomhet

8. Denne eleven føler seg ensom på skolen:

	aldri	sjelden	av og til	omtrent hver uke	omtrent hver dag
	<input type="checkbox"/>				

Plaging

9. Denne eleven opplever å bli erta og plaga:

	aldri	sjelden	av og til	omtrent hver uke	omtrent hver dag
på skoleveien	<input type="checkbox"/>				
i friminutta	<input type="checkbox"/>				
i timene	<input type="checkbox"/>				

10. Denne eleven opplever å bli utestengt slik at hun/han ikke får være med de andre:

	aldri	sjelden	av og til	omtrent hver uke	omtrent hver dag
	<input type="checkbox"/>				

11. Denne eleven plager andre:

	aldri	sjelden	av og til	omtrent hver uke	omtrent hver dag
erter	<input type="checkbox"/>				
slår, sparker, dytter	<input type="checkbox"/>				
holder andre utafor	<input type="checkbox"/>				

Trivsel og humør

12. Humøret til denne eleven er vanligvis:

skiftende	dårlig	middels bra	godt	svært godt
<input type="checkbox"/>				

13. Denne eleven forteller meg om:

	aldri	sjelden	av og til	omtrent hver uke	omtrent hver dag
opplevd ensomhet	<input type="checkbox"/>				
opplevd plaging/erting	<input type="checkbox"/>				
opplevd utestenging	<input type="checkbox"/>				

14. Denne eleven viser:

	aldri	sjelden	av og til	som oftest	nesten alltid
glede over sosial kontakt med medelever	<input type="checkbox"/>				
glede over mestring i skolearbeidet	<input type="checkbox"/>				

15. Denne eleven virker:

	aldri	sjelden	av og til	veldig ofte	hele tida
glad	<input type="checkbox"/>				
trist	<input type="checkbox"/>				
trygg	<input type="checkbox"/>				
engstelig	<input type="checkbox"/>				
annet, fortell:					

16. Denne eleven gruer seg til:

	aldri	sjelden	av og til	som oftest	nesten alltid
friminutta	<input type="checkbox"/>				
timene	<input type="checkbox"/>				

17. På skolen trives denne eleven samla sett:

	veldig dårlig	ikke så bra	godt	kjempegodt
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 5

Reliability testing

The School wellbeing – Student questionnaire: A short presentation

Participants

In November-December 2008, we gathered data to do reliability testing of the School wellbeing – Student questionnaire. We included children in grades 3 and 6 from one elementary school and children in grade 9 from one secondary school. Of the 179 eligible children, 154 (86%) were included in the analyses (Table A).

Table A. Number of children included in the analyses

Children	Grade 3 (N)	Grade 6 (N)	Grade 9 (N)	Total (N)
All children	57	51	82	190
Excluded*	0	1	10	11
Eligible	57	50	72	179
Written consent	56	47	68	171
On sick leave	4	7	0	11
Non-serious completion	0	0	5	5
Included in the analyses	51	40	63	154

* Of the 11 children excluded, two were mentally handicapped with no/minimal verbal language, two had minor competence in the Norwegian language, two were abroad, and five had their schooling in another area

Method

Data were gathered twice three weeks apart using the School wellbeing – Student questionnaire and the Children's Loneliness Scale (Asher and Wheeler 1985). Under the guidance of their class advisor and the author (AL), children filled in the questionnaires in a lesson that was allocated to this task. Test-retest reliability for ordinal questions in the School wellbeing – Student questionnaire was measured by Spearman's rho, and in addition, we measured internal consistency for some possible scales constructed by combining items from the two questionnaires.

Test-retest reliability of the School wellbeing questionnaire

The 49 ordinal questions showed a mean correlation .55, with a range from .30 to .72, between test and retest (all p-values <0.001). The coefficients were roughly normally dispersed, and 82% had values between .45 and .64. Table B presents correlations for the variables used in thesis. The estimated correlations vary between .46 and .71.

Table B. Correlations between test and retest for variables in the School wellbeing – Student questionnaire

Variables	N	Spearman's rho	p-value
School wellbeing	153	.60	<0.001
Sadness	154	.46	<0.001
Anxiety	154	.51	<0.001
Stomach ache	154	.50	<0.001
Headache	152	.53	<0.001
Academic problems	153	.71	<0.001
Disturbed work	150	.64	<0.001
Bothered in class	147	.52	<0.001
Loneliness	151	.57	<0.001
Victimization	154	.49	<0.001
School work enjoyment	154	.69	<0.001
Necessary academic help	151	.60	<0.001
School work satisfaction	153	.63	<0.001
Friends	154	.62	<0.001
Supportive peers	149	.48	<0.001
Supportive teacher	150	.49	<0.001

Validation of selected questions

The questions in the School wellbeing – Student questionnaire were not constructed to make scales, and therefore, there was no option to measure internal consistency among items in Studies 1-3. In the thesis, items are used individually to compose either promoting or adverse factors. The concepts “promoting/adverse” factors should be seen as umbrella concepts and not as latent variables.

Nevertheless, some ad hoc and preliminary analyses were completed on a few questions in combination with items from Children's Loneliness Scale. Four scales were constructed: Loneliness, Friendship, Peer support, and School wellbeing (Table C). The Cronbach's Alphas were acceptable for all the four scales ranging from .70 to .78, and the items from the School wellbeing – Student questionnaire showed moderate to high correlations with the respective total score correlations. The item for *Loneliness* (Do you ever feel lonely at school?) and for *School wellbeing* (How do you like it at school?) had especially strong correlations with the total score correlation; .63 and .61, respectively.

Table C. Preliminary analyses; Validation of single-item questions in the School wellbeing – Student questionnaire (SWSQ) in combination with items from Children’s Loneliness Scale (CLS)

	Scales and Items	Cronbach’s Alpha	Item-to-total score correlation
<i>Loneliness</i>		.78	
SWSQ	Do you ever feel lonely at school?		.63
CLS	I feel alone at school*		.62
CLS	I’m lonely at school*		.64
CLS	I don’t have anyone to play with at school*		.45
CLS	I can find a friend in my class when I need one		.53
<i>Friendship</i>		.73	
SWSQ	Do you have good friends at school?		.47
CLS	It’s easy for me to make new friends at school*		.49
CLS	I have lots of friends in my class*		.63
CLS	I am well liked by the kids in my class*		.50
CLS	I get along with my classmates*		.39
<i>Peer support</i>		.70	
SWSQ	Can you talk to other students when something hurtful or difficult happens to you?		.32
CLS	There’s no other kids I can go to when I need help in school		.45
CLS	I can find a friend in my class when I need one*		.54
CLS	I am well liked by the kids in my class*		.40
CLS	I have nobody to talk to in class		.45
CLS	It’s hard for me to make friends at school		.45
<i>School wellbeing</i>		.73	
SWSQ	How do you like it at school?		.61
CLS	I like school*		.44
SWSQ	How much do you like recess?		.33
SWSQ	Do you look forward to class?		.56
SWSQ	How much do you like school work?		.51
SWSQ	Do you dread recess?		.29
SWSQ	Do you dread classroom time?		.40

* This item is recoded

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Paper I

RESEARCH ARTICLE

Open Access

School wellbeing among children in grades 1 - 10

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Abstract

Background: Determinants of children's school wellbeing have not been extensively studied. In this cross-sectional study of school children we assessed how factors assumed to promote wellbeing and factors assumed to adversely influence wellbeing were associated with self-reported wellbeing in school.

Methods: Children from five schools, 230 boys and 189 girls in grades 1-10, responded to the same set of questions. We used proportional odds logistic regression to assess the associations of promoting and restraining factors with school wellbeing.

Results: In a multivariable analysis, degree of school wellbeing in boys was strongly and positively related to enjoying school work (odds ratio, 3.84, 95% CI 2.38 to 6.22) and receiving necessary help (odds ratio, 3.55, 95% CI 2.17 to 5.80) from teachers. In girls, being bothered during lessons was strongly and negatively associated with school wellbeing (odds ratio, 0.43, 95% CI 0.22 to 0.85).

Conclusions: Different factors may determine school wellbeing in boys and girls, but for both genders, factors relevant for lessons may be more important than factors related to recess. Especially in boys, the student-teacher relationship may be of particular importance.

Background

School wellbeing among children has not been extensively studied, despite substantial efforts to develop relevant indicators related to learning ability, health status and health related behaviour in school settings [1]. Konu and colleagues introduced school wellbeing as a global concept [2], and included questions about social relationships and school work as two essential components [3].

Others have used wellbeing as one of several topics to describe how children experience daily life in school [4]. In a multi-national study by Samdal et al [5] feeling safe, experiencing fair treatment and having supportive teachers were associated with a high level of school satisfaction [5]. Children's connectedness to school [6] has also been linked to good health and good academic achievement [7], and it has been suggested that connectedness could be a useful predictor of social competence, emotional distress, risk of dropping out of school, and involvement in criminal activity [8,9].

In a cross-sectional population study of school children, we have assessed whether school wellbeing is associated with factors that are assumed to promote wellbeing, and factors that may restrain the perception of wellbeing. We hypothesised that the assumed promoting factors would favourably influence wellbeing in school, and that perceived problematic factors would be negatively related to school wellbeing.

Methods

Participants and procedure

This study is based on a convenience sample of children from five schools in Møre and Romsdal County, Norway, who participated in a project that was organized by the schools. The headmasters agreed to participate in two cross sectional surveys that were set two years apart. The headmasters' decision was approved by each School's Collaborative Committee (sanctioned by law, and including representatives for teachers, parents and children). In the present study, data were used from the first survey that was carried out from May to June 2002.

Three schools had grades from 1 to 7, and two schools had grades from 1 to 10. Altogether 423 children were invited, and included all children from four of the schools and children in grades 7-10 from the fifth

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school. The children were between seven and 16 years of age at attendance. One child moved before the data collection started, and three children were on sick leave during the study period. Thus, 419 (99%) children were included in the analyses.

Parents were informed about the survey in the context of a school meeting that indicated the start of the project. Information letters signed by the headmaster and by the principal investigator (AL) were sent to all parents, describing the aims of the survey, and emphasising that participation was voluntary, and that the collected information was confidential. Children/parents who did not want to participate were asked to notify their main teacher or headmaster. In each class, teachers informed the children in greater detail about the survey.

Data were collected using a questionnaire (see Additional files 1 and 2) that was developed by the first author (AL) in close collaboration with school nurses, teachers, and headmasters. In the first step of a pilot study, AL had interviewed more than 30 children in grades 1-7, using the questionnaire as a guide. In a second step, approximately 300 children in grades 1-10 from several schools completed the questionnaire after being supervised by trained teachers. The students reported that the questions were easy to understand, and teachers reported that the questionnaire was easy to use among the youngest as well as among older children. Thus, face validity, construct and content validity of the questionnaire were considered to be good.

The data collection of the present study was administered by school nurses and headmasters. Instead of letting all children fill in the questionnaire themselves, 180 children in grades 1-4, 53 children in grades 5-7, and three children in grades 8-10 were interviewed by trained school nurses who used the questionnaire as a guide. Under the instruction of the school nurse or a trained teacher the remaining 183 children completed the questionnaires themselves during a lesson that was allocated to this task.

Measures

The questionnaire consisted of a combination of items that are assumed to promote school wellbeing, and items that may be adversely associated with school wellbeing. Responses to the questions were ranked on ordinal scales, with four or five response options. Some of the items that were addressed in the questionnaire are more relevant for experiences during lessons and some items are more relevant in recess. Factors assumed to adversely influence school wellbeing included academic problems, disturbances at work, being bothered during lessons, loneliness and victimization (being bullied). Among variables assumed to promote school wellbeing were enjoyment in doing school work, a feeling of

receiving help and assistance when needed, and satisfaction with school work. In addition, supportiveness of friends, peers and teachers was assumed to promote school wellbeing. The given responses should be relevant for the current school year.

The reliability of the questionnaire was tested in another material gathered from children in grades 3, 6, and 9. Of 179 eligible children, the questionnaire was completed by 154 (86%) children two times with three weeks apart. The test-retest reliability for the 49 ordinal questions was acceptable with 82% of the Spearman's rho coefficients ranging between 0.45 and 0.64 (mean rho = 0.55), and all p-values < 0.001. With regard to the 12 variables used in the present study correlations varied from 0.49 to 0.71.

In the questionnaire the following items were addressed, each with the corresponding questions:

School wellbeing

One global question; "How do you like it at school?" with four response options; very bad (1), not so good, good, and very good (4).

Academic problems

Four questions each linked to a certain subject; "Do you have problems with; reading?", "writing?", "mathematics?" or "foreign language (English)?" and each with four response options; no problems (1), some problems, quite a few problems, and lots of problems (4). The response score assigned to "academic problems" was the highest score (one score only) for any of the four questions.

Disturbed work

One question; "At school (in class), do you find the necessary peace to work well?" with five response options recoded 5 to 1 to express increasing degree of disturbance; no, never (5), seldom, sometimes, usually, and yes, always (1).

Bothered in class

One question; "In class, are you bothered in some way that makes you feel bad?" with five response options; never (1), seldom, sometimes, about every week, and about every day (5).

Loneliness

One question; "Do you ever feel lonely at school?" with five response options; never (1), seldom, sometimes, about every week, and about every day (5).

Victimization

Three questions; "During recess, are you bothered in some way that makes you feel bad:," where the three questions were specified as by being "teased?"; by being "hit, kicked or pushed?"; or by being "left out, excluded?" and each with five response options; never (1), seldom, sometimes, about every week, and about every day (5). The response score assigned to "victimization" was the highest score (one score only) for any of the three questions.

School work enjoyment

One question; "How much do you like schoolwork?" with five response options; not at all (1), not much, so-so, fine, and very much (5).

Necessary academic help

One question; "At school (in class), do you feel that you get all the help that you need?" with five response options; no, never (1), seldom, sometimes, usually, and yes, always (5).

School work satisfaction

One question; "At school (in class), how pleased are you with your own work?" with five response options; not at all (1), not much, so-so, fine, and very much (5).

Friends

One question; "Do you have good friends at school?" with five response options; none (1), one good friend, 2-3 good friends, 4-5 good friends, and many good friends (5).

Supportive peers

One question; "Can you talk to other students if something hurtful or difficult happens to you?" with four response options; no, never (1), maybe, probably, and certainly (4).

Supportive teacher

One question; "Can you talk to your class advisor if something hurtful or difficult happens to you?" with four response options; no, never (1), maybe, probably, and certainly (4).

Ethics

The survey was approved by the statutory School Collaborative Committees, and the collection of data was approved by The Norwegian Data Inspectorate.

Statistics

We used proportional odds logistic regression [10], with school wellbeing as the dependent variable. School wellbeing was constructed as an ordinal variable with four categories, and applying proportional odds is expected to be more efficient than using binary logistic regression [11,12]. In relation to categories of wellbeing in school, the model assumes that the odds ratios will be identical for each category increase in wellbeing.

First, we included each independent factor separately, with adjustment only for gender and grade. Thereafter, all covariates were included simultaneously in a multivariable model. Similar analyses were also conducted separately for boys and girls, and in the multivariable analysis, we tested interactions between relevant factors and gender. All tests were two-sided, and p-values < 0.05 were considered significant. The statistical analyses were performed in SPSS for Windows (version 15.0 SPSS, Chicago, Illinois).

Results

Among 419 participating children (230 boys and 189 girls), gender was evenly distributed by school grade (Table 1). Global scores for school wellbeing and scores related to variables that are expected to influence school wellbeing are described in Table 2. On a scale from 1 to 4, with 4 as the best, the median score (interquartile range) for school wellbeing was 3 (3-4). The score results indicated that approximately 92% of the children perceived their school wellbeing as good or very good, whereas 8% reported their school wellbeing as bad or not so good. Most of the factors that are expected to influence school wellbeing displayed a similar distribution with a vast majority of the children reporting the two best scores. Only a small proportion of children reported a high degree of perceived problems in lessons and during recess.

In proportional odds logistic regression analyses, we assessed the association of each variable with the reported school wellbeing score. The left part of Table 3 shows the association of each variable with school wellbeing, after adjustment for gender and grade. In these analyses, all variables except "supportive peers" and "supportive teacher" were significantly associated with school wellbeing, and the direction of the associations was as expected. Thus, variables indicating problems in lessons and recess were negatively related to school wellbeing, whereas enjoying school work showed a strong positive association with school wellbeing (odds ratio, 3.03, 95% CI 2.30 to 4.00), as did the experience of receiving necessary help from the teacher (odds ratio, 3.08, 95% CI 2.35 to 4.05).

In the analysis presented on the right part of Table 3 we assessed the association of each variable with school wellbeing with simultaneous adjustment for all the other covariates listed in the table, in addition to gender and grade. After multivariable adjustment, most of the

Table 1 Study participants according to school grade

Grade	Boys		Girls		Total N
	N	%	N	%	
1	19	59	13	41	32
2	23	44	29	56	52
3	23	45	28	55	51
4	30	67	15	33	45
5	24	59	17	41	41
6	32	76	10	24	42
7	22	48	24	52	46
8	21	57	16	43	37
9	11	39	17	61	28
10	25	56	20	44	45
Total	230	55	189	45	419

Table 2 Distribution of response options for school wellbeing and each of the independent variables

Variables	Response options					Total N	Median	IQR*
	1	2	3	4	5			
School wellbeing ^a	2.7	5.6	52.9	38.9		414	3	3-4
Academic problems ^b	26.3	55.4	13.6	4.8		419	2	1-2
Disturbed work ^c	19.2	39.3	29.5	9.4	2.6	417	2	2-3
Bothered in class ^c	84.3	7.4	7.6	0.7	0	408	1	1-1
Loneliness ^c	60.5	21.5	14.8	1.4	1.7	418	1	1-2
Victimization ^c	55.2	24.2	16.5	2.2	1.9	417	1	1-2
School work enjoyment ^d	2.6	4.8	48.4	35.6	8.6	419	3	3-4
Necessary academic help ^d	1.0	3.4	11.8	43.2	40.6	414	4	4-5
School work satisfaction ^d	1.4	3.3	32.5	46.7	16.0	418	4	3-4
Friends ^d	0.2	2.6	15.8	19.4	62.0	418	5	4-5
Supportive peers ^a	17.5	25.3	15.2	42.0		388	3	2-4
Supportive teacher ^a	17.0	21.2	18.6	43.2		377	3	2-4

* 25-75th percentile

^a From 1 (worst) to 4 (best)

^b From 1 (best) to 4 (worst)

^c From 1 (best) to 5 (worst)

^d From 1 (worst) to 5 (best)

associations that were apparent in the initial analyses (left side of Table 3), were nearly fully attenuated. However, “school work enjoyment” remained strongly associated with school wellbeing (odds ratio, 2.74, 95% CI 1.95 to 3.85), as did receiving “necessary academic help” (odds ratio, 2.23, 95% CI 1.56 to 3.19). Although the association of “victimization” was attenuated, it

remained negatively associated with school wellbeing (odds ratio, 0.71, 95% CI 0.52 to 0.97).

The item “supportive teacher” shifted from being positively associated with school wellbeing in the crude analysis to being negatively associated in the multivariable analysis. This change was explored in additional analyses; Spearman correlations showed that “supportive teacher” was correlated with both “school work enjoyment” and “necessary help” (rho, 0.27, and rho, 0.40, respectively, p-values < 0.001), and we consider the change in the direction of the odds ratio to be a likely artefact that may be explained by co-linearity between variables.

We compared associations across grades, grouping the children into three groups (1-4, 5-7, and 8-10). This resulted in low numbers in some categories, and therefore, low precision in some of the analyses, but the associations were not substantially different compared to the analyses of all children in Table 3.

In the separate analyses of boys and girls (Tables 4 and 5), we found that for boys, the results were quite similar to those described in Table 3. In the multivariable analysis (right part of Table 4), there were strong positive associations of “school work enjoyment” (odds ratio, 3.84, 95% CI 2.38 to 6.22) and receiving “necessary academic help” (odds ratio, 3.55, 95% CI 2.17 to 5.80) with level of school wellbeing. For girls, “bothered in class” was the only variable associated with school wellbeing in the multivariable analysis (odds ratio, 0.43, 95% CI 0.22 to 0.85), showing a clear negative association (right part of Table 5).

We conducted formal testing of interaction with gender in relation to school wellbeing for the four separate variables that clearly differed between girls and boys.

Table 3 Proportional odds logistic regression with school wellbeing as dependent variable

Covariates	Each covariate adjusted only for gender and grade		All covariates, gender and grade, included in the model	
	Odds ratio Estimate (95% CI)	p-value	Odds ratio Estimate (95% CI)	p-value
<i>Restraining factors</i>				
Academic problems	0.52 (0.40 to 0.68)	< 0.001	0.88 (0.63 to 1.24)	0.46
Disturbed work	0.57 (0.46 to 0.70)	< 0.001	0.91 (0.70 to 1.19)	0.51
Bothered in class	0.45 (0.32 to 0.62)	< 0.001	0.79 (0.51 to 1.22)	0.29
Loneliness	0.56 (0.45 to 0.70)	< 0.001	0.93 (0.67 to 1.30)	0.68
Victimization	0.52 (0.42 to 0.64)	< 0.001	0.71 (0.52 to 0.97)	0.03
<i>Promoting factors</i>				
School work enjoyment	3.03 (2.30 to 4.00)	< 0.001	2.74 (1.95 to 3.85)	< 0.001
Necessary academic help	3.08 (2.35 to 4.05)	< 0.001	2.23 (1.56 to 3.19)	< 0.001
School work satisfaction	1.89 (1.48 to 2.42)	< 0.001	1.16 (0.85 to 1.59)	0.34
Friends	1.43 (1.14 to 1.80)	0.002	1.02 (0.76 to 1.38)	0.88
Supportive peers	1.16 (0.97 to 1.38)	0.10	1.12 (0.91 to 1.38)	0.28
Supportive teacher	1.14 (0.93 to 1.38)	0.21	0.72 (0.55 to 0.93)	0.01

Covariates are factors assumed to either promote or restrain children’s wellbeing in school

Table 4 Boys only: Proportional odds logistic regression with school wellbeing as dependent variable

Covariates	Each covariate adjusted only for grade		All covariates and grade, included in the model	
	Odds ratio Estimate (95% CI)	p-value	Odds ratio Estimate (95% CI)	p-value
<i>Restraining factors</i>				
Academic problems	0.57 (0.40 to 0.80)	0.001	0.94 (0.58 to 1.54)	0.82
Disturbed work	0.53 (0.41 to 0.70)	< 0.001	0.99 (0.70 to 1.42)	0.96
Bothered in class	0.50 (0.32 to 0.80)	0.003	1.22 (0.64 to 2.32)	0.55
Loneliness	0.64 (0.47 to 0.86)	0.004	0.97 (0.59 to 1.58)	0.90
Victimization	0.58 (0.43 to 0.78)	< 0.001	0.65 (0.42 to 1.01)	0.06
<i>Promoting factors</i>				
School work enjoyment	4.53 (3.10 to 6.62)	< 0.001	3.84 (2.38 to 6.22)	< 0.001
Necessary academic help	3.99 (2.74 to 5.82)	< 0.001	3.55 (2.17 to 5.80)	< 0.001
School work satisfaction	2.31 (1.66 to 3.19)	< 0.001	1.14 (0.73 to 1.80)	0.57
Friends	1.68 (1.22 to 2.32)	0.002	1.53 (0.99 to 2.37)	0.06
Supportive peers	1.02 (0.82 to 1.27)	0.87	1.04 (0.79 to 1.37)	0.80
Supportive teacher	1.14 (0.88 to 1.49)	0.32	0.55 (0.38 to 0.81)	0.002

Covariates are factors assumed to either promote or restrain children's wellbeing in school

Two of these interactions were statistically significant: "school work enjoyment" (p = 0.01) and "necessary academic help" (p = 0.008), whereas interaction tests for "bothered in class" (p = 0.33) and "supportive teacher" (p = 0.48) were not statistically significant.

Discussion

In this cross-sectional study among school children, high scores on variables that are assumed to promote school wellbeing were associated with higher degree of wellbeing in school, and high scores on variables thought to be perceived as problematic for the children, were related to lower degree of school wellbeing. For boys, high degree of school wellbeing was strongly linked to their enjoyment in school work and to their

experience of receiving necessary help from teachers; and for girls, low degree of school wellbeing was strongly related to feeling bothered in class.

The data of this study are population based; all children in the area attended the same public school system. The schools are located in a rural area with a relatively homogenous culture, and therefore, it is difficult to anticipate to which degree the results can be generalised. The very high attendance is an obvious strength of the study, and despite the relatively wide age range (school grade 1-10), the results did not substantially differ across school grades. By carefully following the questionnaire, the school nurse interviewed the youngest children, whereas older children completed the questionnaire themselves. However, we cannot exclude

Table 5 Girls only: Proportional odds logistic regression with school wellbeing as dependent variable

Covariates	Each covariate adjusted only for grade		All covariates and grade, included in the model	
	Odds ratio Estimate (95% CI)	p-value	Odds ratio Estimate (95% CI)	p-value
<i>Restraining factors</i>				
Academic problems	0.47 (0.30 to 0.71)	< 0.001	0.84 (0.50 to 1.39)	0.49
Disturbed work	0.62 (0.45 to 0.86)	0.003	0.71 (0.46 to 1.11)	0.13
Bothered in class	0.37 (0.23 to 0.61)	< 0.001	0.43 (0.22 to 0.85)	0.02
Loneliness	0.47 (0.34 to 0.65)	< 0.001	0.74 (0.45 to 1.21)	0.23
Victimization	0.45 (0.32 to 0.62)	< 0.001	0.76 (0.48 to 1.22)	0.26
<i>Promoting factors</i>				
School work enjoyment	1.66 (1.08 to 2.56)	0.02	1.60 (0.93 to 2.77)	0.09
Necessary academic help	2.18 (1.46 to 3.26)	< 0.001	0.98 (0.54 to 1.78)	0.95
School work satisfaction	1.42 (0.97 to 2.08)	0.07	1.11 (0.68 to 1.80)	0.69
Friends	1.18 (0.85 to 1.64)	0.34	0.69 (0.44 to 1.07)	0.10
Supportive peers	1.44 (1.08 to 1.93)	0.01	1.31 (0.91 to 1.87)	0.14
Supportive teacher	1.12 (0.83 to 1.50)	0.45	1.00 (0.69 to 1.46)	0.99

Covariates are factors assumed to either promote or restrain children's wellbeing in school

the possibility that this procedure could have influenced the collected information and introduced systematic differences in results between younger and older children.

In the crude analyses, only adjusting for gender and school grade, most factors showed in the expected direction strong associations related to school wellbeing. Thus, factors that were assumed to promote school wellbeing were positively, and factors that were assumed to restrain school wellbeing, were negatively associated with the wellbeing score. However, in the multivariable analyses, where each covariate was adjusted for all the other factors in the model, most of the crude associations were fully attenuated. Moreover, there were patterns in the results that indicated clear differences between boys and girls. Thus, enjoying school work and receiving necessary help from teachers were particularly important for the school wellbeing of boys, whereas in girls, being bothered by others in class was the only variable that remained significant in the multivariable model, and this factor showed a clear negative association with school wellbeing.

It is worth noticing that factors which appear to be important for school wellbeing are related to the lessons, and less to recess, and directly or indirectly, the children's experience with the teachers seems to be important. The effect of peer experiences that other studies have shown to be harmful, such as being bullied [13] or being lonely [14], were attenuated and not statistically significant after multivariable analyses. Similarly, the effects related to having friends and effects of peer support are other relational factors that were attenuated. However, our findings are in accordance with results of other studies using multivariable analyses. Thus, Samdal et al [5] reported that the influence of adults (teachers) was more important for school satisfaction than the influence of other children, and their results also suggested that being alone or being bullied were less important for school satisfaction [5]. In addition, children's reports of teacher likeability (how nice they think their teachers are) seem to be of high value for their school satisfaction [15,16]. The importance of teacher support has also been underlined in longitudinal studies [17,18].

Generally, younger children [5,15,19,20] and girls [5,15,16,19,20] report higher levels of wellbeing in school, but the gender difference may vary by age [5]. In multivariable analyses, our results showed clear gender differences related to factors associated with school wellbeing, whereas in other studies, only minor gender differences were reported [5].

Konu and colleagues, using 80 variables to model school wellbeing showed few gender-dependent patterns with the exception of issues related to health [21]. Nonetheless, there is some evidence to suggest

that girls may experience their teachers as more helpful and friendly than boys tend to do [21], and that girls may be more eager to ask questions related to matters they do not understand [22]. On the other hand, adolescent boys may be more competitive academically than girls, whereas girls tend to be more oriented towards relational aspects [22]. These results may support our findings that school wellbeing among boys may depend on academic teacher support, whereas girls seem particularly vulnerable to relational harm indicated by being bothered in class. Others have reported that the approval of other people may be essential for the wellbeing of adolescent girls [23].

Conclusions

Our results suggest that determinants of school wellbeing among children may differ by gender, but for both genders, the essential factors appear to be closely related to lessons, and not to recess. The teacher's role is important in the promotion of school wellbeing, and a learning environment without harassment is of critical importance.

Additional material

Additional file 1: Skoletrivsel Elevskjema. The Norwegian questionnaire (Skoletrivsel - Elevskjema) used in this study was developed by Audhild Løhre (AL).

Additional file 2: School wellbeing Student questionnaire. Jean Gaffney Kvendset (JGK) translated the original Norwegian questionnaire to English (School wellbeing - Student questionnaire). A retranslation to Norwegian made by a third person, revealed some minor discrepancies. Together, JGK and AL decided the final formulations.

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Authors' contributions

The present cross-sectional study is part of a two year follow-up, planned and administered by AL. All the three authors participated in designing the study. AL and SL did the analyses. AL, SL, and LJV interpreted the data and wrote the paper. All authors have read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

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Paper II



RESEARCH

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Factors associated with internalizing or somatic symptoms in a cross-sectional study of school children in grades 1-10

Audhild Løhre^{1,2*}, Stian Lydersen³, Lars J Vatten¹

Abstract

Background: School related factors that may contribute to children's subjective health have not been extensively studied. We assessed whether factors assumed to promote health and factors assumed to have adverse effects were associated with self-reported internalizing or somatic symptoms.

Methods: In a cross-sectional study, 230 boys and 189 girls in grades 1-10 from five schools responded to the same set of questions. Proportional odds logistic regression was used to assess associations of school related factors with the prevalence of sadness, anxiety, stomach ache, and headache.

Results: In multivariable analyses, perceived loneliness showed strong and positive associations with sadness (odds ratio, 1.94, 95% CI 1.42 to 2.64), anxiety (odds ratio, 1.78, 95% CI 1.31 to 2.42), and headache (odds ratio, 1.47, 95% CI 1.10 to 1.96), with consistently stronger associations for girls than boys. Among assumed health promoting factors, receiving necessary help from teachers was associated with lower prevalence of stomach ache in girls (odds ratio, 0.51, 95% CI 0.30 to 0.87).

Conclusions: These findings suggest that perceived loneliness may be strongly related to both internalizing and somatic symptoms among school children, and for girls, the associations of loneliness appear to be particularly strong.

Background

Children's perceived health status influences their daily life [1,2], and childhood health is also a powerful predictor for health in adulthood [3,4]. Health complaints are typically classified as either emotional or somatic, and a combination of these types of symptoms is not uncommon [5-10].

Anxiety and depression are the most common emotional problems, and appear to be more prevalent among girls, with fairly high co-morbidity (20-50%) [11]. Anxiety tends to predate depression [6,9], and the prevalence may range from 6% to 18% in childhood and adolescence [11]. Depressive disorders are rare among young children, but in adolescence the prevalence may be as high as 8% [11]. The results of long term follow-up studies suggest that early emotional symptoms may

predict higher risk of mental and physical disease in middle age [12-14].

Headache and stomach pain are the most prevalent physical complaints at a young age [15]. Before elementary school, children rarely complain about headache [16], but the prevalence increases with age [10,17,18]. Around puberty, about 15% may report frequent or severe headache, and more than half of the students in high school may report less frequent episodes of headache [17]. Before puberty, the prevalence of reported headache seems to be higher in boys than girls, but after puberty, the prevalence appears to be higher among girls [17,18].

Stomach pain appears to be more frequent among younger than older children [16,19,20]. Recurrence of abdominal pain may range from 10-45% [21], and in adolescence (11-15 years), the total prevalence of self-reported episodes of stomach pain is around 50%, and the estimates are higher for girls than boys [20,22]. Perceived abdominal pain in childhood has been associated

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with higher risk of both physical and mental disorders later in life [23,24].

In school, both circumstances in class and during recess may be important for the children's health and wellbeing. Learning disabilities, low academic achievement or emotional distress may be associated with poorer health [22,25-28]. Victimization caused by bullying, as well as perceived loneliness, have also been associated with adverse health effects, both in the short and long term [29-31]. Further, experiencing caring teachers and belonging to school have been related to good health and wellbeing [32], and negatively associated with emotional distress and risky behaviour [33,34]. There is also evidence to suggest that connectedness to school may be associated with better health in the long term and less risky behaviour [35-37].

In the present study of more than 400 school children, we collected information on self-reported sadness and anxiety, and headache and stomach ache. The aim was to assess whether factors assumed to influence health status, either negatively or positively, were associated with the prevalence of the four symptoms.

Methods

Participants and procedure

This study is based on a convenience sample of children from five schools in Møre and Romsdal County, Norway, who participated in a project that was organized by the schools. The headmasters agreed to participate in two cross sectional surveys that were set two years apart. The headmasters' decision was approved by each School's Collaborative Committee (sanctioned by law, and including representatives for teachers, parents and children). In the present study, data were used from the first survey that was carried out from May to June 2002.

Three schools had grades from 1 to 7, and two schools had grades from 1 to 10. Altogether 423 children were invited, and included all children from four of the schools and children in grades 7-10 from the fifth school. The children were between seven and 16 years of age at attendance. One child moved before the data collection started, and three children were on sick leave during the study period. Thus, 419 (99%) children were included in the analyses.

Parents were informed about the survey in the context of a school meeting that indicated the start of the project. Information letters signed by the headmaster and by the principal investigator (AL) were sent to all parents, describing the aims of the survey, and emphasising that participation was voluntary, and that the collected information was confidential. Children/parents who did not want to participate were asked to notify their main teacher or headmaster. In each class, teachers informed the children in greater detail about the survey.

In this study, we applied a questionnaire that has been described in more detail elsewhere [38]. The reliability of the questionnaire was tested in another material gathered from children in grades 3, 6, and 9. Of 179 eligible children, the questionnaire was completed by 154 (86%) children two times with three weeks apart. The test-retest reliability for the 49 ordinal questions was acceptable with 82% of the Spearman's rho coefficients ranging between 0.45 and 0.64 (mean rho = 0.55), and all p-values < 0.001. With regard to the 15 variables used in the present study correlations varied from 0.46 to 0.71.

The data collection of the present study was administered by school nurses and headmasters. Instead of letting all children fill in the questionnaire themselves, 180 children in grades 1-4, 53 children in grades 5-7, and three children in grades 8-10 were interviewed by trained school nurses who used the questionnaire as a guide. Under the instruction of the school nurse or a trained teacher the remaining 183 children completed the questionnaires themselves during a lesson that was allocated to this task.

Measures

Children's health symptoms were measured by four questions: "Lately, how often have you felt: 1) sadness; 2) anxiety; 3) stomach ache; or 4) headache?" Each question had five response options; never (1), seldom, sometimes, often, and always (5). Sadness and anxiety were denoted internalizing symptoms, stomach ache and headache were denoted somatic symptoms.

The questionnaire consisted of a combination of items that are assumed to promote health, and items that may be adversely associated with health. Factors assumed to adversely influence health included perceived academic problems, disturbances at work, being bothered in class, loneliness and victimization (being bullied). Among variables assumed to promote health were enjoyment in doing school work, a feeling of receiving help and assistance when needed, and satisfaction with performed school work. In addition, supportiveness of friends, peers and teachers was assumed to promote health. Responses to the questions were ranked on ordinal scales, with four or five response options (see Figure 1). The given responses should be relevant for the current school year. The assumed promoting and adverse factors have been described elsewhere [38].

Ethics

The survey was approved by the statutory School Collaborative Committees, and the collection of data was approved by The Norwegian Data Inspectorate.

Statistics

The analyses were performed with proportional odds logistic regression [39] using sadness, anxiety, stomach

Subjects

7. How much do you like schoolwork?

	not at all	not much	so-so	fine	very much
	<input type="checkbox"/>				

8. Do you have problems with any of these subjects:

	no problems	some problems	quite a few problems	lots of problems
reading	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
writing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
mathematics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
foreign language (English)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
P.E.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. Do you feel that you get all the help that you need:

	no, never	seldom	sometimes	usually	yes, always
at school (in class)	<input type="checkbox"/>				
with homework	<input type="checkbox"/>				

10. Do you find the necessary peace to work well:

	no, never	seldom	sometimes	usually	yes, always
at school (in class)	<input type="checkbox"/>				
with homework	<input type="checkbox"/>				

11. How pleased are you with your own work:

	not at all	not much	so-so	fine	very much
at school (in class)	<input type="checkbox"/>				
with homework	<input type="checkbox"/>				

Loneliness

12. What does it mean to be lonely?

Figure 1 An example of questions from the *School wellbeing Student questionnaire*, developed by Audhild Løhre.

ache and headache as dependent variables. First, each factor was included separately as a covariate, adjusting only for gender and grade. Thereafter, all covariates were included simultaneously in a multivariable model. These analyses were also carried out separately for boys and girls.

The health symptoms were categorical ordinal variables with five levels, and applying proportional odds logistic regression is expected to be more efficient than using binary logistic regression [40,41]. In a binary logistic regression, the dependent variable had to be dichotomized at one of four alternative cut points. Proportional

odds logistic regression is equivalent to performing four binary logistic regression analyses simultaneously, and the model assumes the odds ratio to be the same for every cut point.

All tests were two-sided, and p-values < 0.05 were considered significant. The statistical analyses were performed in SPSS for Windows (version 15.0 SPSS, Chicago, Illinois).

Results

Among 419 participating children (230 boys and 189 girls), gender was evenly distributed by school grade [38]. Table 1 shows children's scores for the dependent variables; sadness, anxiety, stomach ache and headache, as well as for each independent, potentially explanatory factor. Most of the children (between 67% and 83%) reported never or seldom to have experienced any of the four symptoms, whereas about one in four children had experienced one or more of the symptoms now and then or more often. The score distribution for the independent variables was similar to the distribution of the outcomes, with the majority of children reporting the two best scores.

Table 1 Distribution of response options for dependent1 and independent2 variables

Variables	Response options					Total N	Median	IQR*
	1	2	3	4	5			
Sadness ^{1a}	24.5	48.9	23.5	2.7	0.5	413	2	2-3
Anxiety ^{1a}	54.7	28.0	12.9	3.2	1.2	411	1	1-2
Stomach ache ^{1a}	39.6	31.9	21.7	5.1	1.7	414	2	1-3
Headache ^{1a}	38.7	28.5	23.6	7.3	1.9	411	2	1-3
Academic problems ^{2b}	26.3	55.4	13.6	4.8		419	2	1-2
Disturbed work ^{2a}	19.2	39.3	29.5	9.4	2.6	417	2	2-3
Bothered in class ^{2a}	84.3	7.4	7.6	0.7	0	408	1	1-1
Loneliness ^{2a}	60.5	21.5	14.8	1.4	1.7	418	1	1-2
Victimization ^{2a}	55.2	24.2	16.5	2.2	1.9	417	1	1-2
School work enjoyment ^{2c}	2.6	4.8	48.4	35.6	8.6	419	3	3-4
Necessary academic help ^{2c}	1.0	3.4	11.8	43.2	40.6	414	4	4-5
School work satisfaction ^{2c}	1.4	3.3	32.5	46.7	16.0	418	4	3-4
Friends ^{2c}	0.2	2.6	15.8	19.4	62.0	418	5	4-5
Supportive peers ^{2d}	17.5	25.3	15.2	42.0		388	3	2-4
Supportive teacher ^{2d}	17.0	21.2	18.6	43.2		377	3	2-4

* 25-75th percentile

^a From 1 (best) to 5 (worst)

^b From 1 (best) to 4 (worst)

^c From 1 (worst) to 5 (best)

^d From 1 (worst) to 4 (best)

We assessed the association of each independent variable with the respective scores for sadness, anxiety, stomach ache and headache. The left part of Table 2, 3, 4, and 5 show the association of each independent variable, with adjustment for gender and grade. In the right part of the tables, the associations are also adjusted for the other variables listed in the table.

Sadness

In the analyses only adjusting for gender and grade (left part of Table 2), most of the variables were significantly associated with sadness scores in the expected direction. Thus, all variables indicating problems in lessons or recess were related to higher degree of sadness, whereas experiencing necessary academic help, perceived satisfaction with the school work, and having many friends were associated with lower sadness scores. In the multivariable analysis (right part of Table 2), most of the associations were attenuated, and "loneliness" was the only variable that remained strongly associated with sadness (odds ratio, 1.94, 95% CI 1.42 to 2.64).

In separate analyses of boys and girls (results not tabulated), the results were similar for both genders, and "loneliness" was the only significant contributor to sadness after multivariable adjustment.

Anxiety

The results related to anxiety (left part of Table 3) correspond to the findings for sadness. However, after multivariable adjustment (right part of Table 3), three variables remained as possible contributors to the anxiety scores. Thus, experiencing academic problems (odds ratio, 1.59, 95% CI 1.14 to 2.21), being bothered during lessons (odds ratio, 1.54, 95% CI 1.04 to 2.27) and loneliness (odds ratio, 1.78, 95% CI 1.31 to 2.42) were all associated with higher degree of anxiety in the multivariable analysis.

Separate analyses by gender showed that experiencing academic problems was the only variable associated with anxiety among boys (odds ratio, 1.69, 95% CI 1.04 to 2.74), whereas in girls, being bothered during lessons (odds ratio, 1.80, 95% CI 1.03 to 3.14) and loneliness (odds ratio, 2.53, 95% CI 1.58 to 4.06) were strongly associated with anxiety.

Stomach ache

All the assumed adverse factors were associated with higher degree of stomach ache (left part of Table 4), whereas receiving necessary academic help was associated with a low degree of stomach ache. After multivariable adjustment (right part of Table 4), most of these associations were fully attenuated, but associations related to being bothered during lessons, loneliness and

Table 2 Proportional odds logistic regression with sadness as dependent variable

Covariates*	Each covariate adjusted only for gender and grade		All covariates, gender and grade, included in the model	
	Estimate (95% CI)	p-value	Estimate (95% CI)	p-value
<i>Adverse factors</i>				
Academic problems	1.74 (1.35 to 2.23)	< 0.001	1.28 (0.94 to 1.74)	0.117
Disturbed work	1.31 (1.09 to 1.58)	0.005	0.98 (0.77 to 1.24)	0.838
Bothered during lessons	2.26 (1.64 to 3.10)	< 0.001	1.41 (0.96 to 2.08)	0.083
Loneliness	2.08 (1.67 to 2.59)	< 0.001	1.94 (1.42 to 2.64)	< 0.001
Victimization	1.56 (1.27 to 1.91)	< 0.001	0.93 (0.71 to 1.23)	0.613
<i>Promoting factors</i>				
School work enjoyment	0.82 (0.65 to 1.03)	0.095	0.97 (0.73 to 1.29)	0.837
Necessary academic help	0.58 (0.46 to 0.74)	< 0.001	0.78 (0.57 to 1.06)	0.115
School work satisfaction	0.73 (0.59 to 0.92)	0.007	0.94 (0.71 to 1.24)	0.651
Friends	0.66 (0.53 to 0.83)	< 0.001	0.82 (0.63 to 1.07)	0.141
Supportive peers	0.94 (0.80 to 1.11)	0.481	1.03 (0.85 to 1.24)	0.764
Supportive teacher	0.88 (0.73 to 1.06)	0.193	0.96 (0.77 to 1.19)	0.703

* Covariates are factors assumed to be associated with children's sadness

receiving necessary academic help remained of borderline statistical significance.

In separate analyses by gender, there were no clear associations with stomach ache among boys. For girls, however, receiving necessary academic help was negatively associated with the reported prevalence (odds ratio, 0.51, 95% CI 0.30 to 0.87).

Headache

The initial results for headache correspond to the patterns observed for sadness and anxiety (left part of Table 5), but after multivariable adjustment, loneliness (odds ratio, 1.47, 95% CI 1.10 to 1.96) was the only variable that remained statistically significant, suggesting

that loneliness is associated with a higher prevalence of headache (right part of Table 5).

In separate analyses by gender, no clear associations with headache were present for boys, but among girls, being disturbed in school work (odds ratio, 1.79, 95% CI 1.21 to 2.65) and loneliness (odds ratio, 1.66, 95% CI 1.08 to 2.57) were both strongly and positively associated with the prevalence of headache.

Discussion

In this cross-sectional study of self-reported internalizing and somatic symptoms among more than 400 school children, we found that perceived loneliness was strongly associated with the prevalence of sadness,

Table 3 Proportional odds logistic regression with anxiety as dependent variable

Covariates*	Each covariate adjusted only for gender and grade		All covariates, gender and grade, included in the model	
	Estimate (95% CI)	p-value	Estimate (95% CI)	p-value
<i>Adverse factors</i>				
Academic problems	2.22 (1.70 to 2.89)	< 0.001	1.59 (1.14 to 2.21)	0.006
Disturbed work	1.51 (1.24 to 1.83)	< 0.001	1.16 (0.90 to 1.50)	0.252
Bothered during lessons	2.49 (1.82 to 3.40)	< 0.001	1.54 (1.04 to 2.27)	0.032
Loneliness	2.31 (1.86 to 2.88)	< 0.001	1.78 (1.31 to 2.42)	< 0.001
Victimization	1.81 (1.47 to 2.22)	< 0.001	1.17 (0.88 to 1.56)	0.287
<i>Promoting factors</i>				
School work enjoyment	0.78 (0.61 to 1.00)	0.052	0.91 (0.67 to 1.23)	0.520
Necessary academic help	0.62 (0.49 to 0.79)	< 0.001	1.18 (0.85 to 1.64)	0.326
School work satisfaction	0.70 (0.55 to 0.89)	0.003	1.02 (0.76 to 1.38)	0.874
Friends	0.71 (0.57 to 0.88)	0.002	0.86 (0.65 to 1.14)	0.296
Supportive peers	1.05 (0.88 to 1.25)	0.580	1.09 (0.89 to 1.34)	0.388
Supportive teacher	0.95 (0.78 to 1.15)	0.573	1.01 (0.80 to 1.29)	0.904

* Covariates are factors assumed to be associated with children's anxiety

Table 4 Proportional odds logistic regression with stomach ache as dependent variable

Covariates*	Each covariate adjusted only for gender and grade		All covariates, gender and grade, included in the model	
	Estimate (95% CI)	p-value	Estimate (95% CI)	p-value
<i>Adverse factors</i>				
Academic problems	1.45 (1.14 to 1.85)	0.003	1.08 (0.80 to 1.46)	0.629
Disturbed work	1.22 (1.02 to 1.47)	0.032	1.12 (0.89 to 1.42)	0.336
Bothered during lessons	1.80 (1.33 to 2.44)	< 0.001	1.44 (0.99 to 2.09)	0.057
Loneliness	1.65 (1.35 to 2.03)	< 0.001	1.33 (0.99 to 1.78)	0.056
Victimization	1.52 (1.25 to 1.85)	< 0.001	1.09 (0.83 to 1.42)	0.538
<i>Promoting factors</i>				
School work enjoyment	0.96 (0.76 to 1.20)	0.698	0.99 (0.75 to 1.31)	0.964
Necessary academic help	0.68 (0.54 to 0.86)	0.001	0.74 (0.54 to 1.01)	0.055
School work satisfaction	0.89 (0.72 to 1.11)	0.307	1.10 (0.83 to 1.44)	0.509
Friends	0.82 (0.66 to 1.01)	0.063	1.04 (0.80 to 1.35)	0.775
Supportive peers	1.09 (0.93 to 1.29)	0.297	1.07 (0.89 to 1.30)	0.451
Supportive teacher	1.02 (0.85 to 1.23)	0.825	1.15 (0.92 to 1.43)	0.227

* Covariates are factors assumed to be associated with children's stomach ache

anxiety and headache, also after adjustment for a number of potentially confounding factors. In separate analyses of boys and girls, loneliness in boys was strongly associated with sadness, whereas in girls, the association of loneliness was equally strong for sadness, anxiety and headache.

The associations of loneliness were robust, and did not substantially change from the crude (only adjusting for grade and gender) to the multivariable analysis. The results suggest that loneliness may be particularly important among girls, since loneliness was the most important correlate to high scores for three of the four symptoms.

The study was conducted in public schools in rural communities, ranging from inland to coastal

environments. The population base and the very high attendance are strengths of the study, but it is a weakness that children from urban settings were not included. In the data collection, younger children were interviewed by school nurses, whereas older children completed the questionnaire themselves. Although the nurses were trained for this task, the possibility that the different procedures could have influenced the responders and introduced systematic differences in results between younger and older children can not be excluded.

Also, the cross-sectional design is a limitation of this study. That the children simultaneously reported exposures and outcomes may lead to inter-related responses to the questions, and could have caused stronger associations between explanatory factors and health outcomes.

Table 5 Proportional odds logistic regression with headache as dependent variable

Covariates*	Each covariate adjusted only for gender and grade		All covariates, gender and grade, included in the model	
	Estimate (95% CI)	p-value	Estimate (95% CI)	p-value
<i>Adverse factors</i>				
Academic problems	1.44 (1.13 to 1.84)	0.003	1.10 (0.81 to 1.48)	0.542
Disturbed work	1.43 (1.19 to 1.73)	< 0.001	1.24 (0.98 to 1.57)	0.071
Bothered during lessons	1.90 (1.41 to 2.58)	< 0.001	1.28 (0.88 to 1.85)	0.198
Loneliness	1.61 (1.32 to 1.98)	< 0.001	1.47 (1.10 to 1.96)	0.010
Victimization	1.57 (1.29 to 1.91)	< 0.001	1.10 (0.84 to 1.44)	0.486
<i>Promoting factors</i>				
School work enjoyment	0.82 (0.65 to 1.03)	0.085	0.99 (0.75 to 1.30)	0.917
Necessary academic help	0.67 (0.53 to 0.85)	0.001	0.93 (0.69 to 1.27)	0.658
School work satisfaction	0.75 (0.60 to 0.93)	0.009	0.89 (0.68 to 1.17)	0.418
Friends	0.78 (0.63 to 0.96)	0.022	0.95 (0.74 to 1.24)	0.728
Supportive peers	1.04 (0.89 to 1.23)	0.608	1.12 (0.93 to 1.34)	0.251
Supportive teacher	0.84 (0.70 to 1.00)	0.056	0.92 (0.74 to 1.14)	0.452

* Covariates are factors assumed to be associated with children's headache

Thus, collecting outcomes at a later stage could have yielded different results. Therefore, the findings should be interpreted with caution, since cross sectional designs limit the possibility to study causal effects.

The internalizing and somatic symptoms that we used as outcome measures in this study are common, and there is evidence suggesting that self-reports of emotional and somatic symptoms are reasonably reliable in studies of health in adolescence [42]. Internalizing and somatic symptoms may infer with children's daily living and cause absence from school [1]. Further, previous studies of internalizing or somatic symptoms in childhood and adolescence have shown an increased risk of anxiety disorders, depression, and somatic illness later in life [3,4,9,12,14,23,24].

In the initial analyses (only adjusting for gender and grade) among factors that were assumed to promote health, children's satisfaction with academic work and the help they receive from teachers were associated with a relatively lower prevalence of symptoms. After mutual adjustment for other variables, only the negative association of help from teachers with stomach ache in girls remained significant. Previously, it has been suggested that academic satisfaction may be beneficial for children's health [43], and that support from teachers may provide protection against poor health [35,44].

Each factor that was assumed to be adversely related to health was associated with higher scores for each of the four symptoms in the crude analyses, but after mutual adjustment for other potentially explanatory variables, most of the initial associations were fully attenuated. In other studies, multivariable adjustment also attenuated the estimates, but to different degrees [42,45-47]. Victimization caused by bullying is an example of a factor that has shown robust associations, also in multivariable analyses.

In this study, loneliness was the only factor that retained the strong relation to poorer health after adjustment for other potentially confounding factors. We cannot rule out the possibility that factors that we failed to include in the study, at least in part, may explain the associations of loneliness. Thus, it has been suggested that close friendship and peer acceptance could modify effects related to loneliness [48-50]. On the other hand, it may be equally plausible that the variable loneliness captures something that in itself is strongly associated with the internalizing and somatic symptoms that we have studied. Sadness may be a key emotion for both depression [6,51,52] and loneliness [48], but the link of loneliness to the physical complaints, headache and stomach pain, may not be easily explained, unless these complaints represent somatic expressions of underlying emotional distress [5,7,53].

Only a few studies have assessed the association of perceived loneliness with health problems in childhood and adolescence, and to our knowledge, no previous study has assessed loneliness in relation to headache or stomach pain. Nonetheless, the strong associations that we found for loneliness and emotional distress are in line with previous findings. In cross-sectional studies, it has been suggested that loneliness is associated with both anxiety [54,55] and depression [30,56], and that persistent loneliness may contribute to later emotional disorders [56]. From a recent prospective study that followed children from childhood to adolescence, it was reported that measures of loneliness at the age of 5 and 9 years could predict depressive symptoms at 13 years of age [57].

Few studies have compared internalizing or somatic symptoms between girls and boys in relation to loneliness, and there are no consistent gender differences [56]. We found, however, a strong association of loneliness with anxiety and headache among adolescent girls, but not in boys, whereas for sadness, there was a clear association of loneliness for both genders.

Conclusions

In this population study of children between 7 and 16 years of age, perceived loneliness appears to be of special importance in relation to internalizing and somatic symptoms, and for girls, perceived loneliness may be particularly important in relation to emotional distress (sadness and anxiety) and physical complaints (headache). Longitudinal studies that measure the impact of factors that are associated with perceived loneliness and their relation with subsequent health problems are recommended.

Emotional and somatic symptoms are common in childhood and adolescence. Teachers, school nurses, clinicians, and others need to be aware of the strong relation between loneliness and ill health, and daily routines should be established to reduce loneliness among school children. It is possible that a caring attention from teachers and school nurses combined with strategic planning of activities and peer collaboration may reduce loneliness among the children.

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Authors' contributions

The present cross-sectional study is part of a two year follow-up, planned and administered by AL. All the three authors participated in designing the study. AL and SL did the analyses. AL, SL, and LJV interpreted the data and wrote the paper. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

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Paper III

RESEARCH ARTICLE

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Peer victimization as reported by children, teachers, and parents in relation to children's health symptoms

Audhild Løhre^{1,2*}, Stian Lydersen³, Bård Paulsen⁴, Magne Mæhle^{5,6} and Lars J Vatten¹

Abstract

Background: Victims of bullying in school may experience health problems later in life. We have assessed the prevalence of children's health symptoms according to whether peer victimization was reported by the children, by their teachers, or by their parents.

Methods: In a cross-sectional study of 419 children in grades 1-10 the frequency of peer victimization was reported by children, teachers and parents. Emotional and somatic symptoms (sadness, anxiety, stomach ache, and headache) were reported by the children.

Frequencies of victimization reported by different informants were compared by the marginal homogeneity test for paired ordinal data, concordance between informants by cross-tables and Spearman's rho, and associations of victimization with health symptoms were estimated by logistic regression.

Results: The concordance of peer victimization reported by children, teachers, and parents varied from complete agreement to complete discordance also for the highest frequency (weekly/daily) of victimization. Children's self-reported frequency of victimization was strongly and positively associated with their reports of emotional and somatic symptoms. Frequency of victimization reported by teachers or parents showed similar but weaker associations with the children's health symptoms.

Conclusion: The agreement between children and significant adults in reporting peer victimization was low to moderate, and the associations of reported victimization with the children's self-reported health symptoms varied substantially between informants. It may be useful to assess prospectively the effects of employing different sources of information related to peer victimization.

Background

Health consequences of peer victimization include higher prevalence of physical complaints and psychosocial maladjustment [1-13], with fairly similar effects between countries [10]. Williams and co-workers drew attention to the importance of dose, and suggested that higher frequencies of victimization were associated with greater risk of health problems [14]. Persistent victimization over an extended time period also predicts more serious health problems [15].

Bullying usually includes aggressive behaviour with repetitive acts and imbalance of power [16,17]. Previous

research has shown great variation in bullying and peer victimization among children, and differences in results may partly be due to different research methods [18]. Self-reports of victimization and health outcomes are more common than the use of information from teachers, parents or peers [6], but it has been suggested that using several informants may be useful in assessing effects of victimization [19]. Agreement between different informants about children's health and behavioral problems is typically low to moderate [20-23], but little is known about the concordance between children and significant adults in the assessment of victimization caused by bullying. Also, it is not clear how victimization, as reported by different responders, may be associated with health outcomes.

We therefore tested the consistency of victimization reported by the children, teachers, and parents in a

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cross-sectional study of school children. Further, we assessed the association of victimization reported by the three sources with the prevalence of emotional and somatic symptoms (anxiety, sadness, stomach ache, headache), as reported by the children.

Methods

Participants and procedure

This study is based on a cross-sectional convenience sample of five schools in Møre and Romsdal County, Norway. The headmasters agreed to participate in two surveys that were set two years apart. Since there is no formal agency for ethical approval of school surveys in Norway, the study was approved by the statutory School Collaborative Committees. In the present analysis, data were used from the first survey that was carried out from May to June 2002.

Parents were informed about the survey in the context of a school meeting, and in each class, teachers informed the children about the survey. Information letters signed by the headmaster and by the principal investigator (AL) were sent to all parents, describing the aims of the survey, and emphasising that participation was voluntary and that the collected information was confidential. Children/parents who did not want to participate were asked to notify their main teacher or headmaster. None of the subjects declined to take part in the survey.

Three schools had grades from 1 to 7, and two schools had grades from 1 to 10. All children from four schools and all children in grades 7-10 from the fifth school were included. Thus, 423 children between seven and 16 years of age were invited, together with their parents and teachers. One child moved before the data collection started, and three children were on sick leave during the study period. Thus, 419 (99%) children participated in the study: we received parent responses for 377 (89%) children, and teacher responses for 403 (95%) children.

The questionnaire was developed by the first author (AL), and has demonstrated satisfactory construct, content, and face validity, as described in detail elsewhere [24]. Briefly, reliability of the questionnaire was tested in another material gathered from children in grades 3, 6, and 9. For 179 eligible children, the questionnaire was completed by 154 (86%) children two times, three weeks apart. The test-retest reliability for the 49 ordinal questions was acceptable with 82% of the Spearman's rho coefficients ranging between 0.45 and 0.64 (mean rho = 0.55), and all p-values < 0.001. For the variables used in the present study, the correlations varied from 0.46 to 0.53.

In the current study, the data collection was administered by school nurses and headmasters. Most of the informants filled in the questionnaire themselves, but younger children and children who had problems with

reading or writing were interviewed by the school nurses. Thus, 180 children in grades 1-4, 53 children in grades 5-7, and three children in grades 8-10 were interviewed by trained school nurses who used the questionnaire as a guide. Under the instruction of the school nurse or a trained teacher the remaining 183 children completed the questionnaires themselves during a lesson that was allocated to this task. At home, one parent filled in the parents' version of the questionnaire, and the class teacher filled in one questionnaire for each child. The questionnaires from different informants were connected by a specific code.

Measures

The questionnaires consisted of a combination of items that may promote wellbeing, and items that may adversely affect wellbeing. Victimization (being bullied) was one of the factors that could adversely be associated with good health. Responses to the questions were ranked on ordinal scales, and responses were to be relevant for the current school year. The following items were addressed, each with the corresponding questions:

Victimization reported by the children

Three questions were asked: "During recess, are you bothered in some way that makes you feel bad: 1) by being teased, 2) by being hit, kicked, or pushed, 3) by being left out, excluded?". Each question had five response options (1-5): never, seldom, sometimes, about every week, and about every day. In the analyses, we employed the question(s) with the highest response score of the three questions (the max score, i.e. one score only).

Victimization reported by parents/teachers

Two questions were asked: "During recess, do others tease or bother your daughter (son) / this child?", and "Does your daughter (son) / this child experience being left out from being together with peers?" Each question had five response options (1-5): never, seldom, sometimes, about every week, and about every day. In the analyses, we employed the question(s) with the highest response score of the two questions (the max score, i.e. one score only).

Health symptoms reported by the children

Four questions were asked: "Lately, how often have you felt: 1) sadness, 2) anxiety, 3) stomach ache, 4) headache?" Each question had five response options (1-5): never, seldom, sometimes, often, and always. Sadness and anxiety were denoted emotional symptoms, stomach ache and headache were denoted somatic symptoms.

Ethics

The survey was approved by the statutory School Collaborative Committees, and the collection of data was approved by The Norwegian Data Inspectorate.

Statistics

Frequency of victimization as reported by the children, by the parents and by the teachers, was used as the “exposure” variable, and the four health symptoms were “outcome” variables. In the correlation analyses, all five options of victimization were used, whereas in the regression analyses, the last two categories were merged to weekly/daily because of low numbers. Each health symptom was dichotomized into “never/seldom” versus “sometimes/very often/all the time”. We used logistic regression analysis to assess the association of victimization frequency with the odds of reporting health symptoms. In the analyses, we adjusted for children’s gender and grade in school. Precision of the associations (odds ratios) were assessed using 95% confidence intervals. Correlations were analyzed by Spearman’s rho, and paired ordinal data were compared using the marginal homogeneity test. Tests for statistical significance were two-sided, and p-values < 0.05 were considered significant. The statistical analyses were performed in SPSS for Windows (version 18 SPSS, Chicago, Illinois).

Results

The distribution of the exposure (victimization) and the outcomes (health symptoms) is shown in Table 1. The three informant groups - children, teachers, and parents - reported nearly the same proportions of victimization, but overall, there was a tendency for children to report less victimization than that reported by teachers or parents (p = 0.12 and p = .042, respectively), whereas the reporting of parents and teachers was similar (p = 0.39), marginal homogeneity test. The categories never and seldom victimized (options 1 and 2) were reported for about 80% of the children, sometimes (option 3) was reported for 14-20%, and weekly and daily victimization (options 4 and 5) was reported for 2-4%. Among the children, more than one of four reported to have

experienced sadness, stomach ache, or headache sometimes, often, or always (options 3-5), and 17% reported a similar frequency of anxiety.

Even though the reported proportions of victimization were fairly similar for the three groups of responders, the concordance in two-way cross-tables of children’s responses with those of the respective teacher or parent varied from complete agreement to complete discordance (Table 2). We received responses from 397 child-teacher pairs (Table 2a), from 371 child-parent pairs (Table 2b), and from 359 teacher-parent pairs (Table 2c). The variations in agreement may be exemplified by Table 2a; among 17 children who reported being victims of bullying weekly or daily, teachers reported 10 of these children as being victimized never or rarely, 4 were assigned sometimes, and for 3 children the agreement was complete. Children’s reports of being victimized sometimes showed a corresponding concordance with the teachers’ reports of victimization. On the other hand, children’s reports of being never or seldom victimized (options 1 and 2) were confirmed by teachers in 274 (88%) of the 312 cases and by parents (Table 2b) in 245 (84%) of 292 cases. The estimated correlations (Spearman’s rho) between responses were 0.17 for children and teachers, 0.29 for children and parents, and 0.36 for teachers and parents. All correlations were statistically significant (all p-values ≤ 0.001).

Table 1 The distribution of response options for health symptoms and victimization

Variables	Response options ^a					Total	Mean	SD
	1	2	3	4	5			
	%	%	%	%	%	N		
Victimization ^b	55.2	24.2	16.5	2.2	1.9	417	1.71	0.95
Victimization ^c	40.5	43.5	13.7	1.0	1.2	402	1.79	0.81
Victimization ^d	41.1	36.0	19.5	1.9	1.6	375	1.87	0.90
Sadness ^b	24.5	48.9	23.5	2.7	0.5	413	2.06	0.79
Anxiety ^b	54.7	28.0	12.9	3.2	1.2	411	1.68	0.90
Stomach ache ^b	39.6	31.9	21.7	5.1	1.7	414	1.97	0.99
Headache ^b	38.7	28.5	23.6	7.3	1.9	411	2.05	1.04

^a From 1 (never) to 5 (most frequently)

^b Reported by children

^c Reported by teachers

^d Reported by parents

Table 2 Three cross-tables (2a, 2b, 2c) of victimization (numbers) reported by different informants

2a. Victimization reported by:	Teachers			
	1	2	3	4
Children				
1: Never	94	99	19	2
2: Seldom	43	38	15	2
3: Sometimes	22	28	16	2
4: Weekly/daily	3	7	4	3
2b. Victimization reported by:	Parents			
	1	2	3	4
Children				
1: Never	99	76	23	4
2: Seldom	35	35	18	2
3: Sometimes	17	18	25	3
4: Weekly/daily	1	4	7	4
2c. Victimization reported by:	Parents			
	1	2	3	4
Teachers				
1: Never	78	52	15	0
2: Seldom	59	64	33	2
3: Sometimes	8	13	20	9
4: Weekly/daily	0	1	4	1

Table 3 Associations of children's self-reported peer victimization with their reports of health symptoms

Victimization reported by:	Health symptoms reported by the children							
	Sadness		Anxiety		Stomach ache		Headache	
	Odds ratio (95% CI)	S&V ^a / V ^e	Odds ratio (95% CI)	A&V ^b / V ^e	Odds ratio (95% CI)	Sa&V ^c / V ^e	Odds ratio (95% CI)	Ha&V ^d / V ^e
Children		N		N		N		N
Never	1.00	53/227	1.00	26/226	1.00	51/229	1.00	62/227
Seldom	1.0 (0.5 to 1.7)	23/99	2.0 (1.1 to 3.9)	20/99	1.4 (0.8 to 2.4)	28/99	1.8 (1.1 to 3.1)	37/98
Sometimes	1.6 (0.9 to 3.0)	25/69	3.5 (1.7 to 7.0)	19/68	2.0 (1.1 to 3.6)	26/68	1.9 (1.0 to 3.5)	24/68
Weekly/daily	3.8 (1.3 to 10.8)	9/16	5.3 (1.7 to 16.1)	6/16	6.7 (2.2 to 20.4)	11/16	7.4 (2.4 to 23.0)	11/16

Logistic regression with sadness, anxiety, stomach ache and headache as the dependent variables and victimization as categorical covariate adjusted for gender and grade. The prevalence is stated in numbers (N).

- ^a Sadness & Victimization
- ^b Anxiety & Victimization
- ^c Stomach ache & Victimization
- ^d Headache & Victimization
- ^e Victimization

We assessed the association of victimization with the prevalence of reported health symptoms, after adjustment for gender and grade. In Table 3, we present associations (odds ratios) of victimization with health symptoms as reported by the children: the results show that a gradual increase in victimization was associated with higher odds of reported health symptoms. Weekly or daily victimization was most strongly associated with both emotional and somatic health symptoms. Compared to never being victimized (the reference category), weekly/daily victimization was associated with approximately seven-fold higher odds of stomach ache (odds ratio, 6.7, 95% CI 2.2 to 20.4) or headache (odds ratio, 7.4, 95% CI 2.4 to 23.0). In relation to emotional symptoms, the corresponding associations with sadness (odds ratio, 3.8, 95% CI 1.3 to 10.8) and anxiety (odds ratio, 5.3, 95% CI 1.7 to 16.1) were also very strong. Less frequent victimization (sometimes) showed statistically

significant associations with anxiety, stomach ache and headache (Table 3), and the category seldom victimized was associated with higher odds of anxiety and headache compared to the reference category.

In separate analyses of boys and girls, the associations of victimization with health symptoms did not substantially differ between the genders, and by dividing the school grades in three groups (1-4, 5-7, and 8-10), the results showed no substantial variation across groups of grades (results not shown).

Similar analyses as those reported in Table 3 were conducted using the frequency of victimization reported by the parents, and by the teachers. Table 4 shows that peer victimization reported by teachers was strongly associated with the children's reported anxiety, but there was no clear association for sadness, or for the somatic symptoms. For victimization reported by parents, each level of victimization was positively associated with

Table 4 Associations of teacher-reported peer victimization with health symptoms reported by the children

Victimization reported by:	Health symptoms reported by the children							
	Sadness		Anxiety		Stomach ache		Headache	
	Odds ratio (95% CI)	S&V ^a / V ^e	Odds ratio (95% CI)	A&V ^b / V ^e	Odds ratio (95% CI)	Sa&V ^c / V ^e	Odds ratio (95% CI)	Ha&V ^d / V ^e
Teachers		N		N		N		N
Never	1.00	46/162	1.00	20/162	1.00	42/163	1.00	45/162
Seldom	0.8 (0.5 to 1.3)	44/168	1.5 (0.8 to 2.8)	28/166	1.1 (0.7 to 1.8)	51/169	1.5 (0.9 to 2.4)	57/168
Sometimes	0.9 (0.4 to 1.8)	14/55	2.9 (1.4 to 6.1)	16/55	1.5 (0.8 to 3.0)	19/54	1.5 (0.8 to 3.0)	20/53
Weekly/daily	1.4 (0.3 to 6.2)	3/8	4.3 (1.0 to 19.5)	3/8	2.5 (0.6 to 10.6)	4/8	1.6 (0.4 to 7.0)	3/8

Logistic regression with sadness, anxiety, stomach ache and headache as the dependent variables and victimization as categorical covariate adjusted for gender and grade. The prevalence is stated in numbers (N).

- ^a Sadness & Victimization
- ^b Anxiety & Victimization
- ^c Stomach ache & Victimization
- ^d Headache & Victimization
- ^e Victimization

Table 5 Associations of parent-reported peer victimization with health symptoms reported by the children

Victimization reported by:	Health symptoms reported by the children							
	Sadness		Anxiety		Stomach ache		Headache	
	Odds ratio (95% CI)	S&V ^a / V ^e	Odds ratio (95% CI)	A&V ^b / V ^e	Odds ratio (95% CI)	Sa&V ^c / V ^e	Odds ratio (95% CI)	Ha&V ^d / V ^e
Parents		N		N		N		N
Never	1.00	37/152	1.00	12/150	1.00	36/152	1.00	61/152
Seldom	1.1 (0.6 to 1.8)	37/133	3.1 (1.4 to 6.7)	24/133	1.5 (0.9 to 2.6)	45/134	0.6 (0.4 to 1.0)	34/133
Sometimes	1.1 (0.6 to 2.1)	21/73	5.3 (2.3 to 12.2)	19/73	1.2 (0.6 to 2.2)	21/71	0.9 (0.5 to 1.7)	24/71
Weekly/daily	3.3 (1.0 to 10.5)	7/13	17.1 (4.7 to 61.7)	7/13	5.0 (1.5 to 16.7)	8/13	2.9 (0.9 to 9.5)	8/13

Logistic regression with sadness, anxiety, stomach ache and headache as the dependent variables and victimization as categorical covariate adjusted for gender and grade. The prevalence is stated in numbers (N).

- ^a Sadness & Victimization
- ^b Anxiety & Victimization
- ^c Stomach ache & Victimization
- ^d Headache & Victimization
- ^e Victimization

anxiety (Table 5), and the highest level of victimization was associated with sadness and stomach ache.

Discussion

In this cross-sectional study of school children, victimization caused by bullying was individually reported by the children, their teacher and their parents, and the concordance between informants was low to moderate. The associations of victimization, as reported by the three sources of information, with the prevalence of emotional and somatic complaints, as reported by the children were also compared. The children's own report of victimization was strongly associated with emotional and somatic complaints, but the reports by teachers and parents showed weaker associations and were mainly related to higher prevalence of anxiety.

The study was conducted in rural communities, ranging from inland to coastal areas. All children attended schools in the Norwegian public school system. The population base and the very high participation are strengths of the study; however, it is a weakness that the data do not include children from urban settings. The convenience sampling of schools and the fact that some schools had grades 1-7 whereas others had grades 1-10 may also be limitations. The reported prevalence of victimization and the consistency of information provided by different informants are, however, in line with findings from other studies. In the collection of data, the younger children were interviewed by school nurses, whereas older children completed the questionnaire themselves. Although the nurses were trained for this task, we cannot exclude the possibility that the different procedures could have influenced the participants and introduced systematic differences in results between

younger and older children. The cross-sectional design is a limitation of this study, since cross-sectional designs limit the possibility to study causal effects; the findings must therefore be interpreted with caution.

Self-reports showed that one in five children perceived themselves as being victimized sometimes or more often, and this proportion does not differ substantially from previous findings of Norwegian school children [16,25,26]. Moreover, the prevalence of victimization, as reported by children, teachers, and parents, was fairly similar, although there was a tendency for children to report a lesser degree of victimization. Others have reported differences between informants, where children generally report a higher prevalence of victimization than teachers or parents [27,28].

Only a few studies have assessed the concordance between children's self-reports of victimization and teachers' reports. Of these, Nuijens et al. [29] found no concordance, while other results [19,30] are fairly similar to ours. The agreement - discordance between self-reports and parental reports has rarely been assessed [19], but in a recent such study [31], the estimated consistency for children who reported to be victimized was higher than in our study, but lower for children who perceived themselves not to be victimized. However, only a small proportion of parents (28%) provided information in that study, and the results may be less reliable than our findings.

In line with previous findings [1,6,8], victimization as reported by the children showed strong associations with self-reports of emotional and somatic symptoms. To our awareness, no previous studies have assessed the association of victimization reported by parents with health complaints reported by the children. We found,

however, weaker associations of parental reports of victimization with children's self-reported health symptoms compared to children's reports of victimization associated with health symptoms. Victimization as reported by teachers also showed weaker associations with children's health symptoms, and this finding corresponds with results from a recent study [29]. It has been suggested [8] that if exposures and outcomes are simultaneously reported (shared variance), this may result in stronger associations than if the information is derived from different sources. To some degree, this may explain some of the differences in the estimated associations of our study, but the findings call for attention nonetheless.

Further, our results suggest that the frequency of victimization may be particularly important since frequency was positively associated with the prevalence of health symptoms, as reported by the children. In studies where victimization was dichotomized, weak associations have been reported [32], whereas in studies using graded categories of victimization, the associations with health symptoms have typically been stronger among children who report relatively higher frequency of victimization [33]. The effect of dose has also been suggested in a large international study [3]. For all the 28 countries that were included, the symptom load increased with increasing frequency of victimization.

Generally, researchers differ in how they regard the low agreement between respondents [22]. In relation to research on wellbeing and quality of life, comprehensive information from different sources may yield important nuances that may enrich the understanding of children's adjustments [20,21]. In relation to psychopathology, some may prefer to handle information from different sources separately [23,34], whereas others suggest deriving consensus by using information from different perspectives and settings [35,36]. In relation to peer victimization, our results suggest that differences between the sources of information should not be ignored. Children who experience being victimized may be overlooked by significant adults, and these children may at the same time experience high burdens of emotional and somatic symptoms.

Conclusions

Victims of bullying in school reported high prevalence of sadness, anxiety, stomach ache and headache, and the association with health symptoms showed a strong and graded relation to the frequency of victimization. Children, teachers, and parents reported fairly similar proportions of children to be victimized, but the concordance between informants varied from complete agreement to complete discordance for victimization reported at the highest frequency (weekly/daily).

Compared to children's reports, victimization as reported by teachers or parents showed weaker associations with children's self-reported health symptoms. Agreement - discordance among informants should be further assessed, and longitudinal studies may clarify the importance of collecting information on peer victimization from different sources.

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Authors' contributions

The present cross-sectional study is part of a two year follow-up, planned and administered by AL. All authors participated in designing the study. AL and SL did the analyses. All authors interpreted the data and wrote the paper, and all authors have read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

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93. Sverre Helge Torp: *erbB* ONCOGENES IN HUMAN GLIOMAS AND MENINGIOMAS.
94. Olav M. Linaker: MENTAL RETARDATION AND PSYCHIATRY. Past and present.
95. Per Oscar Feet: INCREASED ANTIDEPRESSANT AND ANTIPANIC EFFECT IN COMBINED TREATMENT WITH DIXYRAZINE AND TRICYCLIC ANTIDEPRESSANTS.
96. Stein Olav Samstad: CROSS SECTIONAL FLOW VELOCITY PROFILES FROM TWO-DIMENSIONAL DOPPLER ULTRASOUND: Studies on early mitral blood flow.
97. Bjørn Backe: STUDIES IN ANTENATAL CARE.
98. Gerd Inger Ringdal: QUALITY OF LIFE IN CANCER PATIENTS.
99. Torvid Kiserud: THE DUCTUS VENOSUS IN THE HUMAN FETUS.
100. Hans E. Fjøsne: HORMONAL REGULATION OF PROSTATIC METABOLISM.
101. Eylert Brodtkorb: CLINICAL ASPECTS OF EPILEPSY IN THE MENTALLY RETARDED.
102. Roar Juul: PEPTIDERGIC MECHANISMS IN HUMAN SUBARACHNOID HEMORRHAGE.
103. Unni Syversen: CHROMOGRANIN A. Physiological and Clinical Role.

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104. Odd Gunnar Brakstad: THERMOSTABLE NUCLEASE AND THE *nuc* GENE IN THE DIAGNOSIS OF *Staphylococcus aureus* INFECTIONS.
105. Terje Engan: NUCLEAR MAGNETIC RESONANCE (NMR) SPECTROSCOPY OF PLASMA IN MALIGNANT DISEASE.
106. Kirsten Rasmussen: VIOLENCE IN THE MENTALLY DISORDERED.
107. Finn Egil Skjeldestad: INDUCED ABORTION: Timetrends and Determinants.

108. Roar Stenseth: THORACIC EPIDURAL ANALGESIA IN AORTOCORONARY BYPASS SURGERY.
109. Arild Faxvaag: STUDIES OF IMMUNE CELL FUNCTION *in mice infected with MURINE RETROVIRUS*.

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110. Svend Aakhus: NONINVASIVE COMPUTERIZED ASSESSMENT OF LEFT VENTRICULAR FUNCTION AND SYSTEMIC ARTERIAL PROPERTIES. Methodology and some clinical applications.
111. Klaus-Dieter Bolz: INTRAVASCULAR ULTRASONOGRAPHY.
112. Petter Aadahl: CARDIOVASCULAR EFFECTS OF THORACIC AORTIC CROSS-CLAMPING.
113. Sigurd Steinshamm: CYTOKINE MEDIATORS DURING GRANULOCYTOPENIC INFECTIONS.
114. Hans Stifoss-Hanssen: SEEKING MEANING OR HAPPINESS?
115. Anne Kvikstad: LIFE CHANGE EVENTS AND MARITAL STATUS IN RELATION TO RISK AND PROGNOSIS OF CANCER.
116. Torbjørn Grøntvedt: TREATMENT OF ACUTE AND CHRONIC ANTERIOR CRUCIATE LIGAMENT INJURIES. A clinical and biomechanical study.
117. Sigrid Hørven Wiggers: CLINICAL STUDIES OF FIBROMYALGIA WITH FOCUS ON ETIOLOGY, TREATMENT AND OUTCOME.
118. Jan Schjøtt: MYOCARDIAL PROTECTION: Functional and Metabolic Characteristics of Two Endogenous Protective Principles.
119. Marit Martinussen: STUDIES OF INTESTINAL BLOOD FLOW AND ITS RELATION TO TRANSITIONAL CIRCULATORY ADAPATION IN NEWBORN INFANTS.
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121. Rune Haaverstad: OEDEMA FORMATION OF THE LOWER EXTREMITIES.
122. Magne Børset: THE ROLE OF CYTOKINES IN MULTIPLE MYELOMA, WITH SPECIAL REFERENCE TO HEPATOCYTE GROWTH FACTOR.
123. Geir Smedslund: A THEORETICAL AND EMPIRICAL INVESTIGATION OF SMOKING, STRESS AND DISEASE: RESULTS FROM A POPULATION SURVEY.

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124. Torstein Vik: GROWTH, MORBIDITY, AND PSYCHOMOTOR DEVELOPMENT IN INFANTS WHO WERE GROWTH RETARDED *IN UTERO*.
125. Siri Forsmo: ASPECTS AND CONSEQUENCES OF OPPORTUNISTIC SCREENING FOR CERVICAL CANCER. Results based on data from three Norwegian counties.
126. Jon S. Skranes: CEREBRAL MRI AND NEURODEVELOPMENTAL OUTCOME IN VERY LOW BIRTH WEIGHT (VLBW) CHILDREN. A follow-up study of a geographically based year cohort of VLBW children at ages one and six years.
127. Knut Bjørnstad: COMPUTERIZED ECHOCARDIOGRAPHY FOR EVALUTION OF CORONARY ARTERY DISEASE.
128. Grethe Elisabeth Borchgrevink: DIAGNOSIS AND TREATMENT OF WHIPLASH/NECK SPRAIN INJURIES CAUSED BY CAR ACCIDENTS.
129. Tor Elsås: NEUROPEPTIDES AND NITRIC OXIDE SYNTHASE IN OCULAR AUTONOMIC AND SENSORY NERVES.
130. Rolf W. Gråwe: EPIDEMIOLOGICAL AND NEUROPSYCHOLOGICAL PERSPECTIVES ON SCHIZOPHRENIA.
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132. Martinus Bråten: STUDIES ON SOME PROBLEMS REALTED TO INTRAMEDULLARY NAILING OF FEMORAL FRACTURES.
133. Ståle Nordgård: PROLIFERATIVE ACTIVITY AND DNA CONTENT AS PROGNOSTIC INDICATORS IN ADENOID CYSTIC CARCINOMA OF THE HEAD AND NECK.
134. Egil Lien: SOLUBLE RECEPTORS FOR TNF AND LPS: RELEASE PATTERN AND POSSIBLE SIGNIFICANCE IN DISEASE.
135. Marit Bjørgaas: HYPOGLYCAEMIA IN CHILDREN WITH DIABETES MELLITUS
136. Frank Skorpen: GENETIC AND FUNCTIONAL ANALYSES OF DNA REPAIR IN HUMAN CELLS.
137. Juan A. Pareja: SUNCT SYNDROME. ON THE CLINICAL PICTURE. ITS DISTINCTION FROM OTHER, SIMILAR HEADACHES.

138. Anders Angelsen: NEUROENDOCRINE CELLS IN HUMAN PROSTATIC CARCINOMAS AND THE PROSTATIC COMPLEX OF RAT, GUINEA PIG, CAT AND DOG.
139. Fabio Antonaci: CHRONIC PAROXYSMAL HEMICRANIA AND HEMICRANIA CONTINUA: TWO DIFFERENT ENTITIES?
140. Sven M. Carlsen: ENDOCRINE AND METABOLIC EFFECTS OF METFORMIN WITH SPECIAL EMPHASIS ON CARDIOVASCULAR RISK FACTORES.

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141. Terje A. Murberg: DEPRESSIVE SYMPTOMS AND COPING AMONG PATIENTS WITH CONGESTIVE HEART FAILURE.
142. Harm-Gerd Karl Blaas: THE EMBRYONIC EXAMINATION. Ultrasound studies on the development of the human embryo.
143. Noëmi Becser Andersen: THE CEPHALIC SENSORY NERVES IN UNILATERAL HEADACHES. Anatomical background and neurophysiological evaluation.
144. Eli-Janne Fiskerstrand: LASER TREATMENT OF PORT WINE STAINS. A study of the efficacy and limitations of the pulsed dye laser. Clinical and morfolological analyses aimed at improving the therapeutic outcome.
145. Bård Kulseng: A STUDY OF ALGINATE CAPSULE PROPERTIES AND CYTOKINES IN RELATION TO INSULIN DEPENDENT DIABETES MELLITUS.
146. Terje Haug: STRUCTURE AND REGULATION OF THE HUMAN UNG GENE ENCODING URACIL-DNA GLYCOSYLASE.
147. Heidi Brurok: MANGANESE AND THE HEART. A Magic Metal with Diagnostic and Therapeutic Possibilities.
148. Agnes Kathrine Lie: DIAGNOSIS AND PREVALENCE OF HUMAN PAPILLOMAVIRUS INFECTION IN CERVICAL INTRAEPITELIAL NEOPLASIA. Relationship to Cell Cycle Regulatory Proteins and HLA DQBI Genes.
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150. Ketil Jarl Hølen: THE ROLE OF ULTRASONOGRAPHY IN THE DIAGNOSIS AND TREATMENT OF HIP DYSPLASIA IN NEWBORNS.
151. Irene Hetlevik: THE ROLE OF CLINICAL GUIDELINES IN CARDIOVASCULAR RISK INTERVENTION IN GENERAL PRACTICE.
152. Katarina Tunøn: ULTRASOUND AND PREDICTION OF GESTATIONAL AGE.
153. Johannes Soma: INTERACTION BETWEEN THE LEFT VENTRICLE AND THE SYSTEMIC ARTERIES.
154. Arild Aamodt: DEVELOPMENT AND PRE-CLINICAL EVALUATION OF A CUSTOM-MADE FEMORAL STEM.
155. Agnar Tegnander: DIAGNOSIS AND FOLLOW-UP OF CHILDREN WITH SUSPECTED OR KNOWN HIP DYSPLASIA.
156. Bent Indredavik: STROKE UNIT TREATMENT: SHORT AND LONG-TERM EFFECTS
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160. Christina Vogt Isaksen: PRENATAL ULTRASOUND AND POSTMORTEM FINDINGS – A TEN YEAR CORRELATIVE STUDY OF FETUSES AND INFANTS WITH DEVELOPMENTAL ANOMALIES.
161. Holger Seidel: HIGH-DOSE METHOTREXATE THERAPY IN CHILDREN WITH ACUTE LYMPHOCYTIC LEUKEMIA: DOSE, CONCENTRATION, AND EFFECT CONSIDERATIONS.
162. Stein Hallan: IMPLEMENTATION OF MODERN MEDICAL DECISION ANALYSIS INTO CLINICAL DIAGNOSIS AND TREATMENT.
163. Malcolm Sue-Chu: INVASIVE AND NON-INVASIVE STUDIES IN CROSS-COUNTRY SKIERS WITH ASTHMA-LIKE SYMPTOMS.
164. Ole-Lars Brekke: EFFECTS OF ANTIOXIDANTS AND FATTY ACIDS ON TUMOR NECROSIS FACTOR-INDUCED CYTOTOXICITY.
165. Jan Lundbom: AORTOCORONARY BYPASS SURGERY: CLINICAL ASPECTS, COST CONSIDERATIONS AND WORKING ABILITY.
166. John-Anker Zwart: LUMBAR NERVE ROOT COMPRESSION, BIOCHEMICAL AND NEUROPHYSIOLOGICAL ASPECTS.
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168. Eirik Skogvoll: CARDIAC ARREST Incidence, Intervention and Outcome.
169. Dalius Bansevicius: SHOULDER-NECK REGION IN CERTAIN HEADACHES AND CHRONIC PAIN SYNDROMES.
170. Bettina Kinge: REFRACTIVE ERRORS AND BIOMETRIC CHANGES AMONG UNIVERSITY STUDENTS IN NORWAY.
171. Gunnar Qvigstad: CONSEQUENCES OF HYPERGASTRINEMIA IN MAN
172. Hanne Ellekjær: EPIDEMIOLOGICAL STUDIES OF STROKE IN A NORWEGIAN POPULATION. INCIDENCE, RISK FACTORS AND PROGNOSIS
173. Hilde Grimstad: VIOLENCE AGAINST WOMEN AND PREGNANCY OUTCOME.
174. Astrid Hjelde: SURFACE TENSION AND COMPLEMENT ACTIVATION: Factors influencing bubble formation and bubble effects after decompression.
175. Kjell A. Kvistad: MR IN BREAST CANCER – A CLINICAL STUDY.
176. Ivar Rossvoll: ELECTIVE ORTHOPAEDIC SURGERY IN A DEFINED POPULATION. Studies on demand, waiting time for treatment and incapacity for work.
177. Carina Seidel: PROGNOSTIC VALUE AND BIOLOGICAL EFFECTS OF HEPATOCYTE GROWTH FACTOR AND SYNDECAN-1 IN MULTIPLE MYELOMA.

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178. Alexander Wahba: THE INFLUENCE OF CARDIOPULMONARY BYPASS ON PLATELET FUNCTION AND BLOOD COAGULATION – DETERMINANTS AND CLINICAL CONSEQUENCES
179. Marcus Schmitt-Egenolf: THE RELEVANCE OF THE MAJOR HISTOCOMPATIBILITY COMPLEX FOR THE GENETICS OF PSORIASIS
180. Odrun Arna Gederaas: BIOLOGICAL MECHANISMS INVOLVED IN 5-AMINOLEVULINIC ACID BASED PHOTODYNAMIC THERAPY
181. Pål Richard Romundstad: CANCER INCIDENCE AMONG NORWEGIAN ALUMINIUM WORKERS
182. Henrik Hjorth-Hansen: NOVEL CYTOKINES IN GROWTH CONTROL AND BONE DISEASE OF MULTIPLE MYELOMA
183. Gunnar Morken: SEASONAL VARIATION OF HUMAN MOOD AND BEHAVIOUR
184. Bjørn Olav Haugen: MEASUREMENT OF CARDIAC OUTPUT AND STUDIES OF VELOCITY PROFILES IN AORTIC AND MITRAL FLOW USING TWO- AND THREE-DIMENSIONAL COLOUR FLOW IMAGING
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194. Guanglin Cui: FUNCTIONAL ASPECTS OF THE ECL CELL IN RODENTS
195. Ulrik Wisløff: CARDIAC EFFECTS OF AEROBIC ENDURANCE TRAINING: HYPERTROPHY, CONTRACTILITY AND CALCIUM HANDLING IN NORMAL AND FAILING HEART
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198. Nanna Kurtze: THE SIGNIFICANCE OF ANXIETY AND DEPRESSION IN FATIGUE AND PATTERNS OF PAIN AMONG INDIVIDUALS DIAGNOSED WITH FIBROMYALGIA: RELATIONS WITH QUALITY OF LIFE, FUNCTIONAL DISABILITY, LIFESTYLE, EMPLOYMENT STATUS, CO-MORBIDITY AND GENDER
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200. Asta Kristine Håberg: A NEW APPROACH TO THE STUDY OF MIDDLE CEREBRAL ARTERY OCCLUSION IN THE RAT USING MAGNETIC RESONANCE TECHNIQUES

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204. Sylvester Moyo: STUDIES ON STREPTOCOCCUS AGALACTIAE (GROUP B STREPTOCOCCUS) SURFACE-ANCHORED MARKERS WITH EMPHASIS ON STRAINS AND HUMAN SERA FROM ZIMBABWE.
205. Knut Hagen: HEAD-HUNT: THE EPIDEMIOLOGY OF HEADACHE IN NORD-TRØNDELAG
206. Li Lixin: ON THE REGULATION AND ROLE OF UNCOUPLING PROTEIN-2 IN INSULIN PRODUCING β -CELLS
207. Anne Hildur Henriksen: SYMPTOMS OF ALLERGY AND ASTHMA VERSUS MARKERS OF LOWER AIRWAY INFLAMMATION AMONG ADOLESCENTS
208. Egil Andreas Fors: NON-MALIGNANT PAIN IN RELATION TO PSYCHOLOGICAL AND ENVIRONMENTAL FACTORS. EXPERIMENTAL AND CLINICAL STUDIES OF PAIN WITH FOCUS ON FIBROMYALGIA
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218. Arne Åsberg: EPIDEMIOLOGICAL STUDIES IN HEREDITARY HEMOCHROMATOSIS: PREVALENCE, MORBIDITY AND BENEFIT OF SCREENING.
219. Johan Fredrik Skomsvoll: REPRODUCTIVE OUTCOME IN WOMEN WITH RHEUMATIC DISEASE. A population registry based study of the effects of inflammatory rheumatic disease and connective tissue disease on reproductive outcome in Norwegian women in 1967-1995.
220. Siv Mørkved: URINARY INCONTINENCE DURING PREGNANCY AND AFTER DELIVERY: EFFECT OF PELVIC FLOOR MUSCLE TRAINING IN PREVENTION AND TREATMENT
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- 236.Anne Mari Sund: DEVELOPMENT OF DEPRESSIVE SYMPTOMS IN EARLY ADOLESCENCE
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- 242.Beate Sitter: TISSUE CHARACTERIZATION BY HIGH RESOLUTION MAGIC ANGLE SPINNING MR SPECTROSCOPY
- 243.Per Arne Aas: MACROMOLECULAR MAINTENANCE IN HUMAN CELLS – REPAIR OF URACIL IN DNA AND METHYLATIONS IN DNA AND RNA
- 244.Anna Bofin: FINE NEEDLE ASPIRATION CYTOLOGY IN THE PRIMARY INVESTIGATION OF BREAST TUMOURS AND IN THE DETERMINATION OF TREATMENT STRATEGIES
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- 250.Ragnhild Støen: ENDOTHELIUM-DEPENDENT VASODILATION IN THE FEMORAL ARTERY OF DEVELOPING PIGLETS

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252. Hill-Aina Steffenach: MEMORY IN HIPPOCAMPAL AND CORTICO-HIPPOCAMPAL CIRCUITS
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254. Viggo Pettersen: FROM MUSCLES TO SINGING: THE ACTIVITY OF ACCESSORY BREATHING MUSCLES AND THORAX MOVEMENT IN CLASSICAL SINGING
255. Marianne Fyhn: SPATIAL MAPS IN THE HIPPOCAMPUS AND ENTORHINAL CORTEX
256. Robert Valderhaug: OBSESSIVE-COMPULSIVE DISORDER AMONG CHILDREN AND ADOLESCENTS: CHARACTERISTICS AND PSYCHOLOGICAL MANAGEMENT OF PATIENTS IN OUTPATIENT PSYCHIATRIC CLINICS
257. Erik Skaaheim Haug: INFRARENAL ABDOMINAL AORTIC ANEURYSMS – COMORBIDITY AND RESULTS FOLLOWING OPEN SURGERY
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268. Björn Inge Gustafsson: THE SEROTONIN PRODUCING ENTEROCHROMAFFIN CELL, AND EFFECTS OF HYPERSEROTONINEMIA ON HEART AND BONE
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275. Anne Mari Aukan Rokstad: ALGINATE CAPSULES AS BIOREACTORS FOR CELL THERAPY
276. Mansour Akbari: HUMAN BASE EXCISION REPAIR FOR PRESERVATION OF GENOMIC STABILITY
277. Stein Sundstrøm: IMPROVING TREATMENT IN PATIENTS WITH LUNG CANCER – RESULTS FROM TWO MULTICENTRE RANDOMISED STUDIES
278. Hilde Pleym: BLEEDING AFTER CORONARY ARTERY BYPASS SURGERY - STUDIES ON HEMOSTATIC MECHANISMS, PROPHYLACTIC DRUG TREATMENT AND EFFECTS OF AUTOTRANSFUSION
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- 280.Boye Welde: THE SIGNIFICANCE OF ENDURANCE TRAINING, RESISTANCE TRAINING AND MOTIVATIONAL STYLES IN ATHLETIC PERFORMANCE AMONG ELITE JUNIOR CROSS-COUNTRY SKIERS
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