

Jenni Ervasti

Pupil-Related Psychosocial Factors, School Setting, and Teacher Sick Leave: A Collaborative Data Study



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ABBREVIATIONS

ASD	Acute Stress Disorder
BMI	Body Mass Index
CI	Confidence Interval
EU	European Union
FPSS	Finnish Public Sector Study
GHQ-12	General Health Questionnaire, 12 items
ICD	International Classification of Diseases and Related Health Problems
ICD-10	International Classification of Diseases and Related Health Problems, version 10
MMR	Median Mean Ratio
MOR	Median Odds Ratio
OAJ	Opetusalan Ammattijärjestö (Trade Union of Education in Finland)
OECD	Organization for Economic Co-operation and Development
OR	Odds Ratio
PTR	Pupil-Teacher Ratio
PTSD	Post-Traumatic Stress Disorder
RR	Rate Ratio
SEC	Socio-Economic Composition
SEN	Special Educational Needs
SII	Social Insurance Institution
UK	United Kingdom
US	United States
WHO	World Health Organization

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I dedicate this book to my son Luukas: your school years are yet to come, be nice to your teachers!

ABSTRACT

Teachers' work is considered stressful, but the extent to which factors related to the school setting are associated with teacher sick leave remains unknown. This study examined the association between pupil-related psychosocial factors, the school setting, and teacher sick leave. The general framework of this study was based on work stress models that propose that psychosocial factors affect health when the demands of the psychosocial work environment exceed the resources of the employee.

Survey data and register data were collected independently from teachers and pupils during a period from 2003 to 2006. Data were collected from 1) the School Health Promotion Study (2004–2005) by the National Institute for Health and Welfare, and from 2) the Finnish Public Sector Study (FPSS) by the Finnish Institute of Occupational Health, which focuses on the health of municipal employees in 10 towns. The FPSS data are linked to employer register data as well as to register data from other sources. In four of the five articles (sub-studies) that comprise this thesis, register data on teacher sick leave served as an outcome variable. Either data from pupil surveys or from other registers were then linked to these data. In one study, survey data on teacher health, health-risk behaviors, and violent situations at work were used as outcome variables. The number of teachers in these studies varied between 2291 and 8089, depending on the availability of the data. Multilevel regression models served to examine the risk of short-term (1 to 3 days) and long-term (over 3 days) sick leave episodes, the risk of diagnosis-specific absences, or the risk of health problems, health-risk behaviors, and encountering workplace violence among teachers in all comprehensive education or in lower secondary schools only. The study designs were cross-sectional, except for one prospective study.

ABSTRACT

Pupil-related psychosocial factors at school, namely vandalism of school property, bullying, truancy, and school satisfaction, were based on pupils' survey responses aggregated at the school level. Pupil vandalism, bullying at school, and school dissatisfaction were related to increased risk for sick leave among teachers. Vandalism and bullying at school were associated with teachers' short-term sick leave. Pupils' low school satisfaction was associated with teachers' long-term sick leave. In diagnosis-specific analyses, pupils' low school satisfaction predicted teachers' sick leave due to psychiatric diagnoses, more specifically, to neurotic and stress-related disorders. Special needs education seems to pose a challenge for teacher well-being. Male special education teachers were at higher risk for short-term and long-term sick leave than were male teachers in general education. Male special education teachers' risk for encountering mental abuse was three-fold, and their risk for encountering physical violence was five-fold higher than that among male teachers in general education. Although female special education teachers did not differ from female general education teachers with regard to sick leave, they were at greater risk for encountering mental abuse and physical violence than were their female colleagues in general education. The percentage of pupils with special educational needs (SEN) in general education schools was also associated in a gradient manner with all teachers' risk for sick leave. In particular, when the school had few teacher resources in terms of large number of pupils per teacher (>15.3), the risk for long-term absences among teachers rose with increases in the numbers of pupils at school with SEN. Although teachers' sick leave varied significantly between the schools studied, the between-school variation in sick leaves stemmed largely from pupil-related factors and factors related to the school setting.

In conclusion, the results of this study suggest that pupil-related psychosocial factors, such as pupils' problem behavior, school dissatisfaction, and violent or threatening situations in schools, affect teacher health as reflected by their taking sick leave. Attention should focus on teacher well-being, especially in schools characterized by such stressors. Possible actions may include teacher training and interventions to improve psychosocial environments in schools, but also strengthening teacher resources (i.e., reducing the ratio of pupils to teaching staff), especially in schools where the percentage of pupils with SEN is high.

YHTEENVETO

Vaikka opettajien työn henkinen kuormittavuus on todettu monissa aiemmissa tutkimuksissa, tarkempaa tietoa opetustyön terveystilanteista ei juuri löydy. Tässä tutkimuksessa tutkittiin oppilaisiin liittyviä peruskoulun (tai pelkän yläkoulun) opettajien työn psykososiaalisia riskitekijöitä ja näiden yhteyttä opettajien sairauspoissaoloihin. Oppilaisiin liittyvien psykososiaalisten tekijöiden oletettiin vaikuttavan opettajien terveyteen tilanteissa, joissa kouluympäristön ja oppilaiden vaatimukset, esimerkiksi oppilaiden ongelmakäyttäytyminen tai erityishuomiota vaativien oppilaiden määrä, ylittävät opettajan kyvyt hallita tilannetta.

Aineistona käytettiin oppilas- ja opettajakyselyjä vuosilta 2003–2006. Oppilasaineisto oli Terveyden ja hyvinvoinnin laitoksen hallinnoimasta Kouluterveyskyselystä vuosilta 2004 ja 2005. Opettajakysely- ja rekisteriaineistot olivat Työterveyslaitoksen hallinnoimasta Kunta 10 -tutkimuksesta, jossa tutkitaan kuntahenkilöstön hyvinvointia 10 kunnan alueella. Kunta 10 -tutkimusaineistoon on yhdistetty työnantajien rekisteritietoja sekä rekisteritietoja muista lähteistä.

Neljässä tutkimuksessa viidestä vastemuuttujana käytettiin työnantajien rekisteritietoja opettajien sairauspoissaoloista. Nämä tiedot yhdistettiin henkilöittäin kyselyaineistoihin tai muihin rekisteritietoihin. Oppilasvastauksista muodostettiin koulua kuvaavia aggregaattimuuttujia, jotka yhdistettiin opettajien rekisteritietoihin. Yhdessä tutkimuksessa kyselyillä saatua tietoa opettajien terveydestä, terveyskäyttäytymisestä sekä väkivaltatilanteista työpaikalla käytettiin vastemuuttujana. Tutkimukseen osallistuneiden opettajien määrä oli 2 291–8 089.

Lyhyiden ja pitkien poissaolojen riskiä tutkittiin monitasomallinuksilla. Yhdessä tutkimuksessa käytettiin myös sairauspoissaolojen diagnoositietoja. Yhtä pitkittäisasetelmassa tehtyä tutkimusta lukuun ottamatta tutkimukset tehtiin poikkileikkausasetelmassa.

Tutkimuksessa havaittiin, että kouluissa, joissa useat oppilaat raportoivat ongelmakäyttäytymistä (ilkivallantekoja, kiusaamista ja luvattomia poissaoloja) ja koulutytyymättömyyttä, opettajilla oli enemmän sairauspoissaoloja. Oppilaiden raportoima koulun omaisuuteen kohdistunut ilkivalta ja kiusaaminen koulussa olivat yhteydessä opettajien lyhyisiin (1–3 päivää) sairauspoissaoloihin. Oppilaiden luvattomat poissaolot eivät olleet yhteydessä opettajien sairauspoissaoloihin. Oppilaiden raportoidulla ongelmakäyttäytymisellä ei ollut yhteyttä opettajien pitkiin (yli 3 päivää) poissaoloihin, mutta oppilaiden koulutytyymättömyys lisäsi opettajien pitkiä sairauspoissaoloja.

Diagnoositietoihin perustuva analyysi osoitti, että koulunkäyntiin tyytymättömien oppilaiden opettajilla oli kohonnut riski mielenterveysperusteiseen sairauspoissaoloon. Erityisesti heillä oli riski sairastua vaikeaan stressiin ja neuroottisiin häiriöihin, kuten pelko-, ahdistus-, sopeutumis- ja pakko-oireisiin häiriöihin. Koulutytyymättömyydellä ei ollut yhteyttä lyhyisiin poissaoloihin.

Erityisopetus lisäsi opettajien terveysriskejä. Miespuolisilla erityisopettajilla oli enemmän sekä lyhyitä että pitkiä poissaoloja kuin miesopettajilla yleisopetuksessa. Miespuoliset erityisopettajat raportoivat kolme kertaa useammin henkisen ja viisi kertaa useammin fyysisen väkivallan kokemuksia työpaikalla kuin miespuoliset yleisopettajat. Myös naispuoliset erityisopettajat raportoivat henkisen ja fyysisen väkivallan kokemuksia huomattavasti useammin kuin naispuoliset yleisopettajat. Lisäksi kaikkien yleiskoulujen opettajien lyhyet ja pitkät sairauspoissaolot olivat sitä yleisempiä, mitä suurempi osuus koulun oppilaista kuului erityisopetuksen piiriin. Riski erityisesti pitkiin poissaoloihin kasvoi, jos koulussa oli lisäksi paljon (> 15,3) oppilaita opettajaa kohden, eli opettajaresurssit olivat vähäiset. Koulujen välillä oli vaihtelua opettajien sairauspoissaolojen määrässä. Koulujen välinen vaihtelu kuitenkin pieneni tai jopa hävisi, kun kouluympäristöön liittyvät ennustajat lisättiin analyysiin.

Tutkimuksen tulokset osoittavat, että opettajien hyvinvointiin tulee kiinnittää huomiota erityisesti kouluissa, joissa on paljon erityisoppilaita, oppilaiden ongelmakäyttäytymistä ja koulutytyymättömyyttä. Tarvittavia toimenpiteitä ovat muun muassa opettajien jatkokoulutus esimerkiksi väkivaltilanteissa toimimiseen ja kehittämishankkeet, jotka kohdistuvat sekä oppilaiden että opettajien psyykkiseen ja sosiaaliseen hyvinvointiin. Kuitenkin erityisesti kouluihin, joissa on paljon erityishuomiota vaativia oppilaita, tarvitaan myös lisää opettajia.

LIST OF ORIGINAL ARTICLES

This thesis is based on the five original publications listed below. The original articles are referred to in the text with Roman numerals (I–V). The original articles have been republished in this report with the permission of Oxford University Press, Elsevier Limited, John Wiley & Sons, Inc., and Scandinavian Journal of Work, Environment & Health.

- I Ervasti, J., Kivimäki, M., Puusniekka, R., Luopa, P., Pentti, J., Suominen, S., Vahtera, J., & Virtanen, M. (2012). Association of pupil vandalism, bullying and truancy with teachers' absence due to illness: A multi-level analysis. *Journal of School Psychology*, 50 (3), 347–361.
- II Ervasti, J., Kivimäki, M., Puusniekka, R., Luopa, P., Pentti, J., Suominen, S., Ahola, K., Vahtera, J., & Virtanen, M. (2012). Students' school satisfaction as predictor of teachers' sickness absence: a prospective cohort study. *European Journal of Public Health* 22 (2), 215–219.
- III Ervasti, J., Kivimäki, M., Pentti, J., Suominen, S., Vahtera, J., & Virtanen, M. (2011). Sickness absence among Finnish special and general education teachers. *Occupational Medicine* 61, 465–471.
- IV Ervasti, J., Kivimäki, M., Pentti, J., Salmi, V., Suominen, S., Vahtera, J., & Virtanen, M. (2012). Work-related violence, and lifestyle and health of special education teachers working in Finnish basic education. *Journal of School Health* 82 (7), 336–343.
- V Ervasti, J., Kivimäki, M., Kawachi, I., Subramanian, S.V., Pentti, J., Ahola, K., Oksanen, T., Pohjonen, T., Vahtera, J., & Virtanen, M. (2012). Pupils with special educational needs in basic education schools and teachers' sickness absence: a register-linkage study. *Scandinavian Journal of Work, Environment and Health* 38 (3), 209–317.

1. INTRODUCTION

There are more than 50 000 teachers and about 550 000 pupils in Finnish comprehensive schools (Kumpulainen, 2001; Statistics Finland, 2011). Pupils and teachers share the same work environment, and are in constant interaction with each other. Thus, it is likely that their well-being is inter-related. Internationally, teachers are among the most studied occupational groups and many studies on their well-being report high levels of work stress, exhaustion and mental disorders (Bauer, Unterbrink, Hack, et al., 2007; Borg, Riding, & Falzon, 1991; DeFrank & Stroup, 1989; Kinnunen & Leskinen, 1989; Kyriakou & Sutcliffe, 1978; Maslach & Leiter, 1999; Santavirta, Solovieva, & Theorell, 2007; Unterbrink et al., 2007; Wieclaw, Agerbo, Mortesen, & Bonde, 2005). In 2009 in the Finnish education sector, 46% perceived their work as mentally straining (Perkiö-Mäkelä, 2010). Moreover, experiences of stress symptoms and mental abuse were more common in the education sector than in any other sector (Perkiö-Mäkelä, 2010). However, research so far has been largely descriptive, cross-sectional and based solely on self-report data, and few studies have examined determinants of teachers' absence from work due to illness (i.e., "sick leave"). The specific work-related stressors contributing to teacher ill-health and disability risks are therefore not well known.

1.1 Psychological stress and psychosocial factors at work

In this thesis, psychological stress refers to a particular relationship between person and environment, where demands of the environment exceed the person's resources (Lazarus & Folkman, 1984; Lazarus, 1990). Stressful encounters (i.e., stressors) are those that are evaluated

by the person as involving harm, threat, demand, or load. Once the person-environment relationship has been appraised as troubled, coping processes—confronting, distancing, self-controlling, seeking social support, accepting responsibility, escape-avoidance, problem solving, or positive reappraisal—begin (Lazarus, 1993). Coping processes change over time and depend on the situational contexts in which they occur. These processes influence the person's subsequent appraisal and hence the intensity of the stress reaction (Lazarus, 1990).

Psychological stress emerges in the relationship between the person and the psychosocial work environment, such that there is no objective way to predict psychological stress as a reaction without reference to properties (characteristics) of the person (Lazarus & Folkman, 1984). Lazarus and Folkman emphasized the importance of individual perceptions in the determination of whether an event or a certain situation will be evaluated as stressful. Hence, a situation that provokes a stress reaction in one teacher may be viewed by another teacher as unimportant or even as a welcomed change (McCarthy, Lambert, O'Donnell, & Melendres, 2009).

In occupational settings, psychosocial work-related stress is defined as pathophysiological changes related to psychological responses to the social (work) environment (Hemingway & Marmot, 1999). It is assumed that the adverse health effects of psychosocial risk factors operate through a stress reaction, and in work settings psychosocial factors are a part of the overall psychosocial work environment. Classical theories of psychosocial work stress include the demand-control model by Robert Karasek (1979), which later included the construct of social support (Karasek & Theorell, 1990), and the effort-reward imbalance model by Johannes Siegrist (1996). Because these models have commonly been used in research on teachers' stress and well-being, a more detailed description of these models and related evidence follow (section 1.2).

1.2 Studies on psychosocial factors in the school setting

Psychosocial work factors that cause stress have been theorized to be low job control, high demands and low social support (demand-control-social support model, also known as the iso-strain model, Karasek &

1. INTRODUCTION

Theorell, 1990). Supporting this theory, Dworkin, Haney, Dworkin, and Telschow (1990) showed that teacher ill-health was associated with high levels of stress, and that stress-related illnesses were less common in schools where the head teacher was perceived as supportive. A recent German study (Unterbrink et al., 2008) also found that support from colleagues, head teachers, parents, and pupils were all positively associated with teacher health. Furthermore, Hakanen, Bakker, and Schaufeli (2006) found in their cross-sectional study that burnout mediated the effect of high demands on teacher ill-health. In a similar vein, time pressure and managing pupil misbehavior explained most of the variance in emotional exhaustion among Cypriot teachers (Kokkinos, 2007), and heavy workload was the most significant factor in explaining differences in psychosomatic symptoms, such as persistent irritability, anxiety, high blood pressure, and insomnia, among Hong Kong teachers (Jin, Yeung, Tang, & Low, 2008). In a study of Spanish school teachers, psychological distress was associated with heavy workload, low job satisfaction, high job stress, female gender, and personality characteristics of the teachers (Moreno-Abril et al., 2007). A French study (Kovess-Masféty, Rios-Seidel, & Sevilla-Dedieu, 2007) showed an association between teacher mental health problems and lack of support from colleagues. The study also showed that mental health problems were related to fear of physical or verbal violence. This finding was consistent with the study by Unterbrink et al. (2008), which found that pupils' verbal insults were most strongly correlated to teacher health. Finally, Shirom, Oliver, and Stein (2009) demonstrated in a longitudinal setting that baseline job demands of teachers—heterogeneous classes, disciplining pupils, home-work conflict, extracurricular duties, and, to a lesser extent, physical conditions—had a unidirectional effect on teachers' somatic complaints at follow-up after controlling for baseline somatic complaints.

Another model characterizing psychosocial stress at work, proposed by Siegrist (1996), emphasized the imbalance of efforts made at work and rewards received from work. Efforts made at work consist of demands or obligations of work. Rewards consist of income, career mobility, job security, esteem, and respect received from work and from the work community. There is empirical evidence supporting the hypothesis that high efforts combined with low rewards may increase the risk of poor health (Siegrist, 2005; van Vegchel, de Jonge, Bosma, & Schaufeli,

2005). A study of German teachers suggested that 22% of the teachers had a disturbed balance of (too much) effort and (too low) rewards. These teachers also had a high degree of burnout symptoms compared to teachers in studies done in other countries (Unterbrink et al., 2007). As to the mechanism through which the imbalance may affect health, Bellingrath, Weigl, and Kudielka (2008) found evidence of subtle cortisol dysregulation, pointing to altered hypothalamus-pituitary-adrenal axis negative feedback sensitivity among teachers with high levels of burnout and low rewards from work. Later, they also found that so-called allostatic load (McEwen, 2000), which was hypothesized to be a possible biological pathway for how chronic work stress and exhaustion could lead to poorer health, was higher among female teachers suffering from high effort-reward imbalance or from exhaustion (Bellingrath, Weigl, & Kudielka, 2009).

The psychosocial school environment has an influence on pupils' well-being as well (Sellström & Bremberg, 2006). Negative changes in pupils' influence over school work, work demands, and peer relations have been associated with poorer health and lower self-worth among the pupils (Gillander Gådin & Hammarström, 2003), and poor social relationships with peers and teachers have been associated with pupils' psychosomatic health complaints (Bergh, Hagquist, & Starrin, 2010). A positive school environment was especially crucial for pupils with a negative home environment: a positive school environment moderated the association between a negative home environment and health risk behaviors (Freeman, King, Kuntsche, & Pickett, 2011).

1.2.1 Pupil-related psychosocial factors

While general theories on psychosocial work stress aim to generalize health-damaging work characteristics across different occupations, there certainly are aspects in the psychosocial work environment that are specific within occupations and occupational groups (Shirom et al., 2009). Indeed, several authors (Maslach & Leiter, 1999; Montgomery & Rupp, 2005) have proposed models of teacher stress and burnout, which suggest that environmental factors (the school setting), organizational characteristics (including psychosocial factors and pupil behavior) and personal qualities of teachers' all contribute to teachers stress and

1. INTRODUCTION

burnout. Unlike the many previous studies described so far, this study examined the psychosocial factors in teachers' work that are caused by pupils and teacher-pupil interaction, such as pupil problem behavior, school dissatisfaction, and violent, threatening, or abusive situations in schools. These pupil-related psychosocial factors may be associated with teacher health and sick leave.

Problem behaviors, as indicated by vandalism, bullying, and truancy, are a part of a wider cluster of antisocial behaviors, poor academic achievement and unfavorable circumstances (Miller & Plant, 1999; van der Aa, Rebollo-Mesa, Willemsen, Boosma & Bartels, 2009). All forms of problem behavior are more common among boys than among girls (Luopa, Lommi, Kinnunen & Jokela, 2010). *Vandalism* in a school context means destroying or breaking up school property, i.e., sports or music equipment, desks, chairs, or windows in classrooms. In a Canadian study, adolescent boys who were on a persistent upward vandalism trajectory scored higher in impulsiveness, risk-taking, and energy and lower in empathy than those who were not (Carrasco, Barker, Tremblay, & Vitaro, 2006). While in 2004/05 the proportion of Finnish lower secondary school pupils with recurrent delinquent behavior including vandalism had decreased, the proportion increased to 20% in 2008/09. In 2008/09, a total of 23% of boys and 16% of girls engaged in recurrent delinquent behavior including vandalism of school property (Luopa et al., 2010).

Bullying is defined as a situation where a pupil, or a group of pupils, say or do nasty and unpleasant things to another pupil, or when a pupil is teased repeatedly in a way he or she does not like (Kaltiala-Heino, Rimpelä, Marttunen, Rimpelä, & Rantanen, 1999; Olweus, 1996). More broadly, bullying is repeated physical or verbal actions with hostile intent that cause distress to victims. It also involves a power differential: with repeated bullying, the bullies increase their power and victims lose their power (Currie et al., 2008). However, both being a bully and being bullied are related to several negative health consequences, such as depression, health-risk behavior and suicidal ideation (Kaltiala-Heino et al., 1999; Kim & Leventhal, 2008; Radliff, Wheaton, Robinson, & Morris, 2012; Volk, Craig, Boyce, & King, 2006). Furthermore, being bullied is associated with feelings of being unsafe and unhappy at school, and being a bully has been associated with delinquency in adulthood

1. INTRODUCTION

(Kaltiala-Heino et al., 1999). In 2008/09, a total of 8% of pupils (10% of boys and 7% of girls) in lower secondary schools in Finland had been bullied. No significant change in bullying occurred in the 2000s (Luopa et al., 2010).

Truancy (i.e., unauthorized absence from school) is associated with lower school satisfaction and to pupils having difficulties in their studies (Luopa, Pietikäinen & Jokela, 2006; Currie et al., 2008), and, at school level with psychosocial problems among the school staff (Virtanen, Kivimäki, et al., 2009). Of the pupils in Finnish lower secondary schools in 2008/09, a total of 9% reported having been truant at least twice during the previous month (Luopa et al., 2010).

School satisfaction is considered an indicator of the emotional and affective aspects of quality of life in the school setting (Samdal, Nutbeam, Wold & Kannas, 1998; Currie et al., 2008). School satisfaction has been linked to positive health outcomes, school achievement, motivation and interest (Currie et al., 2008): it reflects positive attitudes towards school, and is negatively associated with pupil problem behavior. In 2008/09, a total of 6% of Finnish lower secondary school pupils (8% of boys and 3% of girls) reported not liking school at all (Luopa et al., 2010). School dissatisfaction may be visible to teacher as a lack of effort and motivation among pupils, which undermines the teacher's work and may be perceived as highly unrewarding and stressful (Geving, 2007).

School violence includes aggressive and violent behaviors committed in schools and during school-based activities. Interpersonal or direct violence is defined as behavior by persons aimed at other persons that intentionally threatens, attempts, or actually causes physical harm. Less serious forms of violence are generally classified as aggressive behavior, including targeted verbal, physical, or gestural behavior that is intended to cause minor physical harm, psychological distress, intimidation, or to induce fear (Greene, 2005). Above-mentioned forms of problem behaviors, bullying especially, can be labeled as aggressive behavior targeted towards other pupils. In the following, school violence is examined as workplace violence, i.e., when it is directed towards teachers.

Of the perpetrators of school violence, 90% are pupils (Daniels, Bradley, & Hays, 2007). Experiences of pupils' insulting behavior (mental abuse) were common among Finnish secondary school teachers; 45% of teachers experienced insulting behavior from pupils during the

2007–2008 school year and 66% of teachers reported having experienced such behavior at some point during their teaching career. Verbal threats of violence from pupils were also fairly common; 24% of teachers had experienced verbal threats of violence during their teaching career, and 7% experienced them during the examined school year. Physical violence from pupils was less common, but 11% of teachers in secondary schools had experienced physical violence from pupils during their teaching career and 4% had experienced physical violence from pupils during the 2007–2008 school year. (Salmi & Kivivuori, 2009). Violent, threatening, and abusive situations in schools are a serious threat to teacher well-being: encountering violence at school may cause negative emotions, such as anger, shame, anxiety, and sorrow. It may also decrease general life satisfaction (Dzuka & Dalbert, 2007), and even symptoms of post-traumatic stress disorder (PTSD) or acute stress disorder (ASD) (Daniels et al., 2007). Violence and other stressful life events have been shown to increase the risk of later sick leave among men (Kivimäki, Vahtera, Elovainio, Lillrank, & Kevin, 2002).

1.2.2 The school setting: special needs education and teacher resources

According to the current understanding, psychosocial factors are likely to be conditioned and modified not only by individual experiences but also by the social structures and contexts in which they exist (Joensuu et al., 2012; Martikainen, Bartley, & Lahelma, 2002; Rugulies, 2012). This means that the effect of psychosocial factors on every individual's health is not necessarily always the same, emphasizing the need to examine the context and the setting where a study has been conducted. In this thesis, the school setting was taken into account by using multilevel modeling: controlling for the random effects, i.e., the variance between schools, accounts for the differences between them. Moreover, the percentage of *pupils with special educational needs* (SEN) and teacher resources in schools, as indicated by *pupil-teacher ratio* (PTR), were examined as school-setting characteristics that may contribute to the association between pupil-related psychosocial factors and teachers' sick leave.

In Finland, the grounds for the decision of acceptance or transfer a pupil to special education are determined by local school authorities. In

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2010, a total of 21% of pupils who were accepted/transferred to special education were assessed as having learning difficulties caused by impaired linguistic development (dysphasia). A further 16% were assessed as having cerebral dysfunction, physical disability or similar, 13% as having emotional disturbance or social maladjustment, 16% as having slightly delayed development, 6% as having severely delayed development, 3% as having learning difficulties related to autism or Asperger's syndrome, and 1% as having visual or hearing impairment (Statistics Finland, 2010a).

Having a high percentage of pupils with SEN in a school may impact the pupil-related psychosocial environment and thus pose an extra challenge to teacher health. Delinquency, problem behaviors, such as bullying and vandalism, and violence towards teachers are more common among pupils with SEN than among pupils in general education (McIntosh, Horner, Chard, Dickey, & Braun, 2008) and a high risk for violence among special education teachers has been observed in studies from Finland (Kivivuori & Salmi, 2009; Salmi & Kivivuori, 2009) and Denmark (Wieclaw et al., 2005). A recent Dutch study (Vrijmoeth, Monbaliu, Lagast, & Prinzie, 2012) reported rather high prevalence of behavioral problems, such as disruptive or self-absorbed behavior, anxiety, and social relating problems, among children with motor and intellectual disabilities; 18% and 8% based on parent and daily caretaker reports, respectively. The prevalence estimates of behavioral problems are higher for children with motor disabilities when compared to those for children in representative community samples (Vrijmoeth et al., 2012).

Teachers' perceptions of stress have been shown to be associated with having higher number of challenging pupils, such as those with SEN, and the difference between teachers reporting high stress and those reporting moderate stress was on average just a few pupils with SEN (McCarthy et al., 2009). Teaching pupils with SEN has been linked to teacher mental health—male teachers in special needs education have been found to be particularly vulnerable to anxiety disorders, as well as psychological distress (Kovess-Masféty et al., 2007). Moreover, risks for violence and threat of violence are highest among young teachers, male teachers, and special education teachers (Salmi & Kivivuori, 2009).

A preference towards the integration and inclusion of pupils with SEN to general education classes is included in both Finnish national legislation and in the United Nations' Salamanca declaration. Inclusion has

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positive effects on pupils with SEN (Kvalsund & Bele, 2010; Myklebust & Båtevik, 2005; 2009), but it may pose an extra challenge for teacher well-being through stress caused by work overload (Talmor, Reiter, & Feigin, 2005), especially if resources are not targeted accordingly.

There is recent evidence that work overload contributes to mental disorders (Bonde, 2008; Kivimäki, Hotopf, & Henderson, 2010). This research is however susceptible to problems that arise with the use of self-reports, such as subjectivity and recall bias. To overcome these problems, some studies have used objective measures of work overload; a Finnish study carried out among hospital ward personnel showed that one objective measure of chronic workload, patient overcrowding, predicted depressive disorders among hospital staff (Virtanen, et al., 2008; Virtanen, Batty, et al., 2010).

Among teachers, a similar objective measure of workload might be teacher resources, as indicated by the pupil-teacher ratio (PTR) at school. The Organization for Economic Co-operation and Development (OECD, 2011), defines the PTR as comparing the number of pupils (in full-time equivalent) to the number of teachers (in full-time equivalent). In 2009, the PTR in Finnish elementary and lower secondary schools was lower than in other OECD countries: the average PTR in Finland was 13.6 in elementary education, which is below both the EU average (14.5) and the OECD average (16.0). In lower secondary education, the Finnish PTR was 10.1, which is also below the EU (11.3) and the OECD (13.5) averages. Interestingly, the PTR decreases between primary and secondary education in most of the OECD countries including Finland, despite a general increase in class size between primary and secondary education. As class size is measured taking into account the instruction time per pupil and teaching hours per teacher, the decrease in PTR may reflect differences in annual instruction time, which tends to increase with the level of education, or it may result from differences in teaching hours at different levels. Teaching hours decrease with the level of education, as teacher specialization increases (OECD, 2011).

Past research has demonstrated that small classes (less than 20 pupils) in the first three years of education have positive effects on pupil outcomes both in the short and long term (see Finn, Gerber, & Boyd-Zaharias, 2005, for review). Positive outcomes include increased academic achievement, fewer referrals to special education and fewer discipline problems.

Small class sizes in early grades are also cost-effective (Muennig & Woolf, 2007), but studies on the health benefits for pupils of reduced class sizes have shown mixed findings (Muennig, Johnson, & Wilde, 2011). The positive effects of small class size were particularly strong for at-risk pupils, such as minority pupils and pupils with families of lower socioeconomic status. This is, however, true only with regard to class size (=number of pupils in class). Finn, Gerber, Achilles, and Boyd-Zaharias (2001) showed in their study using data from Tennessee's project STAR—a controlled experiment including more than 5000 pupils from kindergarten to third grade in which pupils were randomized into small classes, full-size classes, or classes with a full-time teaching assistant—that decreasing the PTR or adding teacher aides in classes had little or no impact on pupil achievement.

The mechanism through which smaller class size impacts on pupil outcomes is largely unknown. There are at least three hypotheses regarding this mechanism. The first and most popular hypothesis is that teachers of small classes provide more individualized instruction. Research, however has not been able to support this perception (Shapson, Eason, Wright, & Fitzgerald, 1980). The second hypothesis claims that small classes let teachers use their knowledge effectively, but large classes prohibit the effective use of good teaching methods. Supporting this assumption are studies that have found that teachers in small classes spend more time on instruction and less on classroom management. Yet most evidence points to the conclusion that the change is not in teacher behavior, but in pupil behavior (Finn & Achilles, 1999). A review of studies of pupil behavior in small classes indicated that pupils in small classes were more engaged in learning and were better behaved than pupils in large classes (Finn, Pannozzo, & Achilles, 2003). The extent to which class size or the PTR is associated with teacher health has not yet been studied. It is possible that lower PTRs have beneficial effects on teacher well-being and health, or that the PTR acts as an effect modifier between other school characteristics and teacher health.

1.2.3 Other factors related to the school setting

Disadvantaged neighborhoods—characterized by low levels of education, high unemployment, and low economic resources—affect health-risk

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behaviors and violence among adolescents (Greene, 2005; Karriker-Jaffe, Foshee, & Ennett, 2011). Pupils' socioeconomic composition (SEC) at school is defined as the rate of pupils with low socioeconomic background at school. It is often measured vicariously using parents' education, income, or occupational status and is linked to neighborhood characteristics since most comprehensive school pupils go to schools near their home.

Disadvantaged school neighborhoods and pupil SEC at school may also affect the pupil-related psychosocial environment at school. In a Finnish study, pupils in low SEC schools had a higher risk for smoking and illicit drug use than those in schools with high SEC despite the individual pupil's socioeconomic status (Virtanen, Pietikäinen, et al., 2009). Moreover, pupil SEC at school has been associated with pupils' school achievement (Oxford & Lee, 2011; Sellström & Bremberg, 2006). The effect of socioeconomic differences on school achievement is seen both at the individual and at the school level; pupils from lower socioeconomic backgrounds tend to perform worse than those from higher socioeconomic backgrounds, but also lower pupil SEC at school is associated with poorer school achievement and lower school satisfaction, again despite the pupils' individual socioeconomic status (Elovainio et al., 2011).

The school neighborhood is associated with teacher well-being also; Finnish teachers working in schools in low-income neighborhoods report a higher prevalence of mental health problems, emotional exhaustion, and alcohol use than do teachers who work in wealthier areas. They also tended to perceive their competence as teachers to be poorer than their colleagues working in wealthier areas (Virtanen, Kivimäki, et al. 2007). These cross-sectional findings of Virtanen and colleagues were later confirmed by another study (Virtanen, Kivimäki, et al., 2010). They found that both having a low-income school neighborhood and a low-income area of teacher residence were predictive of teachers' long-term sick leaves.

However, when compared to other OECD member countries, Finland has a smaller than average difference in reading performance between pupils from different socioeconomic backgrounds (OECD, 2011). Moreover, in comparison with the OECD average, Finland seems to have relatively little between-school variation, and more within-school variation in school achievement, and to have little variation across schools in pupil SEC (OECD, 2011). Still, regional socioeconomic differences regarding educational outcomes do exist also in Finland (Malin, 2005).

1.3 Teacher characteristics

Teacher characteristics that are associated with teacher health and sick leave include age, sex, teacher type/occupation, and employment contract.

Teachers' age and sex. Age and sex are strong predictors of health and of sickness absenteeism. Age has implications for teacher health in such a way that physical work ability deteriorates with increased age and with the appearance of health problems, and thus sick leaves become more common. In 2008, of Finnish elementary school teachers 10% were less than 30 years of age, 87% were between 30–59 years old, and 3% were 60 years or older. The corresponding percentages in the EU and the OECD countries were 15%, 81%, and 4%. The age distribution of teachers in lower secondary school was quite similar to that of elementary school teachers (OECD, 2010). To summarize, Finnish school teachers start their career at a later age than do their colleagues in the EU and OECD, possibly due to education requirements (longer duration).

In general, women take more sick leave than men do. Differences between occupations held by women and men have been suggested to explain a large part of this variation (Laaksonen et al., 2010). Like in most EU and OECD countries, in Finland teaching is a female-dominant profession also. In 2008, 78% of teachers in elementary schools in Finland were women. In lower secondary schools 71% of teachers were women. Compared to other EU and OECD countries, primary school teaching in Finland is less female-dominant, but lower secondary school teaching is more female-dominant (OECD, 2010).

Teacher type/occupation. General education teachers, special education teachers, and head teachers are all referred to as teachers in this study. Although teaching is at least a part of work duties in all of these jobs in the field of education, they do differ from one another to some extent. Thus, the health of teachers in general education, in special education and in administration may also differ. The work of special education teachers is demanding and consists of teaching, background work, and consultation of parents, therapists, and other teachers. Thus, special education teachers need a good knowledge of special education and to have excellent interaction skills. Despite the facts that the profession of special educators is respected and that they have slightly higher salaries

than do general education teachers, special education teachers often find their work to be exhausting (Takala, Pirttimaa & Törmänen, 2009). Past research has produced conflicting results when comparing the stress levels of general education teachers with those of special education teachers. Special educators' stress levels have sometimes been lower (Trendal, 1989), sometimes higher (Male & May, 1997), and sometimes at the same as those of general education teachers (Williams & Gersch, 2004).

Due to their supervisory position, head teachers have a higher salary than do general education or special education teachers. They perceive their work as highly motivating, but also as highly demanding due to conflicting demands and time constraints, which can lead to stress (Phillips, Sen & McNamee, 2007), turnover intentions, and lack of qualified candidates for head teacher position: this has been found in both Finnish (Sandén, 2007) and international studies (Krüger, van Eck & Vermeulen, 2005; Shen, Cooley & Wegenke, 2004).

Employment contracts of teachers. The type of employment contract has also been associated with health. Short-term employment, unemployment, and health may form a vicious cycle in which poor health is a factor that decreases opportunities for secure employment, and is a result of unemployment and related disadvantages. However, no consistent evidence has been found regarding health differences between temporary and permanent workers in the Finnish municipal sector. It has been found that temporary workers may have fewer sick leaves due to their insecure employment (Virtanen, 2003). In Finland, temporary employment is common among teachers: in 2008, 26% of the employees working in the education sector had a fixed-term job contract. The corresponding percentage in the whole municipal sector was 20% and across the whole private sector it was 8% (Lehto & Sutela, 2008).

1.4 Sick leave as an indicator of health

Absenteeism is recognized as behavior with multiple psychosocial and medical determinants (Wynn & Low, 2008). A distinction is usually made between voluntary and involuntary absenteeism, with a varying degree of employee choice between the two. In the occupational health literature, absenteeism is mostly viewed as involuntary absenteeism due to illness (Väänänen, Tordera et al., 2008).

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Previous research has demonstrated that psychosocial factors at work are important predictors of employee health and of sick leave (Duijts, Kant, Swaen, van den Brandt, & Zeegers, 2007; Elovainio, Kivimäki, & Vahtera, 2002; Kivimäki, Head, et al., 2003; Niedhammer, Bugel, Goldberg, Leclerc, & Guéguen, 1998; Vahtera, Kivimäki, Pentti, & Theorell, 2000; Virtanen, Vahtera, et al. 2007). Because pupil problem behavior is perceived as highly stressful by teachers (Bauer et al., 2007; Borg et al., 1991; Hastings & Bham, 2003; Kovess-Masféty et al., 2007; Kyriakou & Sutcliffe, 1978; Moreno-Abril et al., 2007; O'Connor & Clarke, 1990; Unterbrink et al., 2008), the psychosocial work environment at school may be deteriorated by increasing job demands, or feelings of imbalance between effort and rewards.

In public schools, as in other public-sector workplaces in Finland, all sick leave certificates, irrespective of where they are issued, must be forwarded to the employer for recording. For periods of up to 3 days, employees complete their own certificates. For absences longer than 3 days, medical certificates are required. For absences longer than 9 days, the Social Insurance Institution of Finland (SII) pays sick pay for all residents of Finland aged 16 to 67 years. If the employer pays salary during the sick leave period, the sick pay from the SII goes to the employer (Joensuu, Kivistö, Malmelin, & Lindström, 2008). In the municipal sector, employees get full pay for up to 60 days of sick leave. After that, 2/3 of the employees' salary is paid for up to 120 days. Additionally, based on consideration, 2/3 of the salary can be paid for a maximum of 185 days (Kunnallinen työmarkkinalaitos, 2010).

Research on sick leave as measure of health status has demonstrated that doctor-certified long absences are a strong predictor of actual ill-health and mortality (Kivimäki et al., 2003; Marmot et al., 1995; Semmence, 1987; Vahtera et al., 2004). The relationship between short-term, self-certified absence and actual ill-health is more ambiguous. The study by Marmot et al. (1995) concludes that *"while longer spells of absence may be better indicators of ill health, short spells are not determined by social or psychological factors alone. Most of the health measures that predicted longer spells also predicted shorter spells, albeit to a lesser extent"*.

The studies by Kivimäki et al. (2003) and Vahtera et al. (2004) found that short-term absences were not associated with mortality, but compared with no absence, taking a few absences was associated with

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decreased rather than increased risk of death. This is in line with Kristensen's (1991) assumption that sick leave is a coping strategy against work strain. Short-term absences have been linked to age and employment duration in such a way that short-term absences are more common among younger employees, and a U-shaped association was found for employment duration (Thompson, Griffiths & Davison, 2000). Engström and Janson (2009) found that along with older age, a managerial or supervising position and self-employment reduced the risk of short-term sick leave; this was assumed to mean that fewer short-term absences were related to a position in work life (with more control over work time) that had been acquired over a period of time. Short-term absences also predict long-term absences, especially among women with a discontinuous employment history (Lu et al., 2010). Moreover, one study found that short-term absences decreased by 16% when satisfaction with the psychosocial work environment increased: the relationship was even stronger for longer absence episodes (Munch-Hansen et al, 2009). To conclude, while short-term absences are not as strong predictor of mortality as long-term absences are, they may still reflect minor illnesses, such as common colds that usually are not life-threatening.

1.5 Absenteeism as organizational behavior

In management literature, absenteeism has mainly been viewed as voluntary organizational behavior caused by individual and social characteristics (Väänänen, Tordera et al., 2008). The illness flexibility model (Johansson & Lundberg, 2004), also called the expected utility model or decision model (Steensma, 2011), combines the somewhat opposing views of absenteeism of the fields occupational health and management by proposing that even sick leave entails degrees of voluntariness, and the decision to stay home or to go to work is influenced by individual and social characteristics. The study by Johansson and Lundberg (2004) showed that having few opportunities to reduce or otherwise alter work effort when feeling ill did increase sick leave among women, and that attendance requirements (negative consequences of absence on, e.g., the individual, colleagues, or clients/pupils) were strongly associated with fewer sick leaves among both men and women. In accordance with this,

low control over working time was associated with increased risk for sick leave among women (Ala-Mursula, Vahtera, Kivimäki, Kevin & Pentti, 2002). Moreover, a study by Väänänen, Tordera et al. (2008) showed that the more tolerant the work group absence norms were, the more the individual's absence behavior was influenced by his/hers attitudes toward work attendance.

In conclusion, sick leave is a phenomenon with multiple determinants. A study by Virtanen (1994) demonstrated how fear of dismissal might contribute to “an epidemic of good health” at the workplace. As he concluded “...*in the attempt to interpret sickness absence figures, we should carefully analyze the social context of the phenomenon*”. Sick leave is related to illness, but also influenced by events at the workplace and the state of the labor market in general (Virtanen, 1994).

1.5.1 Absenteeism among teachers

Research on absenteeism among school teachers has largely been conducted from the point of view presented in the management literature. Teacher absenteeism has been associated with school district absence policies (Ehrenberg et al., 1991), workplace absence norms/absence culture (Bradley, Green, & Leeves, 2007), school ethical climate (Rosenblatt, Shapira-Lishcinsky & Shirom, 2010; Shapira-Lischinsky & Rosenblatt, 2010), and with teacher commitment, the psychosocial work environment, and poor leadership (Gaziel, 2004). Previous research has also proposed that pupil absences and lack of motivation may stimulate teacher absences (Ehrenberg et al., 1991), which in turn may have an impact on pupil achievement. In Finland however, teachers are well aware of the attendance requirements, and absence levels among them are low in general (Oksanen, Joensuu & Vahtera, 2010), suggesting a tendency towards presenteeism (working while ill; Aronsson, Gustafsson, & Dallner, 2000) and towards intolerant absence norms/culture rather than voluntary absenteeism or shirking behavior. Indeed, in Sweden the highest risk for presenteeism was found among workers in health care and education sectors (Aronsson et al., 2000).

A longitudinal study conducted in the US showed that teacher absenteeism adversely affected pupils' level of achievement in elementary

schools (Miller, Murnane, & Willett, 2008ab). The study concluded that the mechanisms that link teacher absenteeism to pupils' level of achievement are related to the low qualifications of substitute teachers in some parts of the US, and to disruption of the regular flow of classroom events. Substitute teachers were also seen as unable to implement the long-term instructional strategies of a regular teacher, and as not possessing the regular teacher's detailed knowledge about individual pupils (Miller et al., 2008ab).

1.6 Gaps in previous research

As described in the previous sections, a number of studies on the working conditions and health of school teachers suggest higher levels of work stress, exhaustion, mental symptoms, and stress-related disorders in school teachers compared to those in many other occupations. There are also numerous studies on demonstrating associations between psychosocial factors and teacher well-being. In this section, these studies are evaluated using Sir Austin Bradford Hill's guidelines (Fletcher & Fletcher, 2005; Howick, Glaziou & Aronson, 2009) for whether the relationship between a psychosocial factor and well-being is likely to be causal or just an association. These guidelines, which were later set into three categories by Howick et al. (2009), are as follows:

- Direct evidence of causality: temporality, strength of association, reversibility and dose-response relationship between exposure and outcome
- Mechanistic evidence of causality: biological plausibility
- Parallel evidence of causality: consistency, coherence and analogy to earlier research

Direct evidence of causality is provided with appropriate temporal proximity (cause precedes effect and effect occurs after a plausible interval), when size of the effect is not attributable to plausible confounding factors, and with dose-responsiveness and reversibility. The first and most common limitation of studies on psychosocial factors and teacher well-being is the lack of temporality; although earlier studies suggested

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several psychosocial risk factors to be associated with teacher stress and poor health, these studies have been mainly cross-sectional. Therefore the direction of causality between exposure and outcome is impossible to determine. Some studies (e.g., Shirom et al., 2009) have, however, been conducted in a longitudinal setting where a baseline level of the outcome was controlled for.

The relative risks (expressed as the odds ratio or rate ratio) have usually been quite large, which indicates strong associations. This, however, may also be due to common method bias in which individual-related factors (e.g., attitudes, response style, and negative affectivity) artificially inflate associations by affecting both the perception of the school environment and outcomes measured. Common method bias is an important source of both type I (false positive) and type II (false negative) errors in studies based on self-report data (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

In the behavioral sciences, within which teacher well-being has mostly been studied, the guideline of dose-response relationship (the larger the exposure, the larger the association with the outcome) is seldom investigated. Actually, the preference in the behavioral sciences for the use of continuous variables instead of categorical variables inhibits these kinds of investigations. The reversibility of the results, meaning that a reduction in exposure would be followed by reduction in the outcome, would further strengthen the causality hypothesis.

The second set of guidelines deal with the mechanistic evidence of causality that connects the exposure and the outcome, i.e., evidence for a mechanism of action. Biological plausibility means that the results make sense according to the biologic knowledge of the time. Biological plausibility is provided, for example, by studies by Bellingrath et al. (2008; 2009), where psychosocial factors and burnout were linked to changes in cortisol levels.

The third set of guidelines deal with parallel evidence. Parallel evidence emerges when related studies produce similar findings. Consistency of evidence means that the result is repeatedly observed by different persons, in different places, circumstances, and times. Since the well-being of teachers has been studied by different researchers in different countries, in different schools, and in different decades, this criterion is well met in studies on teacher well-being. Similarly, although longitudinal studies

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on teachers are rather scarce, the effects of psychosocial factors on the health of employees have been demonstrated elsewhere (Elovainio et al., 2002; Kivimäki et al., 2003; Niedhammer et al., 1998; Siegrist, 2005; Vahtera et al., 2000; van Vegchel et al., 2005; Virtanen, Vahtera, et al., 2007). This fulfills the criteria of analogy, i.e., a cause-effect relationship already established for a similar exposure or outcome.

Specificity (one cause leading to one effect) was studied by Shirom et al. (2009). They argued, and demonstrated, that for each strain (outcome) under consideration, its central relational meaning would determine the directionality associated with its relationship with stressors (exposures). Specificity is more often found for acute infectious diseases and for genetic diseases than for chronic diseases. The health problems caused by work strain can plausibly be assumed to develop over time, and, as with chronic diseases, they are likely to have many causes. Although the presence of specificity is strong evidence for causality, the absence of it is weak evidence against a causal relationship (Fletcher & Fletcher, 2005). In fact, Howick et al. (2009) omitted the guideline of specificity from their revised guidelines, due to the fact that diseases usually have multiple causes and multiple effects, and most interventions also have multiple effects.

To conclude, there are some major limitations in the existing evidence. First, since earlier research has either been descriptive or based on self-report measures, reliable evidence about the health or disability risks associated with teaching work is still largely lacking. For example, it is not known with which diseases the potential health problems are associated, and the contributing factors are largely unknown. Previous studies have relied on teachers' self-reported perceptions of both the school characteristics and the measured outcomes; thus, the findings are open to common method bias. Bias related to self-report data cannot totally be avoided even in prospective studies. Therefore, the ability to assess school characteristics in some other way than by using teachers' reports is of specific importance. Also, studies showing the effects of teacher resources at school on the health of teachers are lacking.

Moreover, studies have rarely been based on multilevel modeling where, in addition to variance between teachers, the variance between schools also can be taken into account. Studies on teacher absenteeism are scarce, and absenteeism has largely been studied from the point of

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view adopted from management literature. In the management literature, absenteeism is often suggested to be affected by social context, such as norms, rather than by ill health. This may have led to rather biased views about the factors that are associated with teacher absenteeism.

2. THE PRESENT STUDY

2.1 Study context: The Finnish school system

The Finnish school system is considered a success by the OECD Programme for International Student Assessments (PISA: OECD, 2010). Basic education is funded by tax revenue and arranged by municipalities, so it is free of charge to pupils. The act on the state subsidy of basic municipal services (1704/2009) states that municipalities receive the subsidy based on the number of 6 to 15 year olds. Additional increases to the state subsidy are calculated based on population density, the bilingual population, and other special characteristics of the municipalities. Municipalities have, however, control over how these resources are allocated.

Compulsory basic education lasts for 9 years, of which the first 6 years are elementary (primary) school and the last 3 years are lower secondary school. Compulsory basic education starts from the year a child turns seven. If the objectives of basic education are not likely to be achieved during the nine years due to a child's physical, mental, or emotional challenge, compulsory education starts 1 year earlier and lasts for 11 years. The number of pupils transferred to special education has increased in Finland constantly during the last 10 years, being 9% in 2009 (Statistics Finland, 2009).

The qualifications of teachers and head teachers are legislated in a Council of State regulation (986/1998). Practically all Finnish basic education teachers have a Master's degree. Also school head teachers have to be qualified teachers, and their compulsory teaching time depends on the school type and the number of classes at school. Special

2. THE PRESENT STUDY

education teachers mostly provide special lessons in regular schools, i.e., special education is mainly organized according to the pull-out model, where pupils needing special education visit a special education teacher's class. In cases of severe learning difficulties, full-time special education is organized within the regular school or in separate special education schools (Takala, Pirttimaa, & Törmänen, 2009). In 2010, the majority (86%) of pupils with SEN were placed in regular schools, and only 14% were in special schools. Of the pupils with SEN in regular schools, 34% were taught full-time in general education groups, and 66% were taught part-time in a special education group or in special classes (Statistics Finland, 2010b).

In recent years, the Finnish school system has been under attention both nationally and internationally due to success in PISA studies (OECD, 2010). While the Finnish school system has been praised in many medias and countries (for examples see, BBC, 2010; Business Insider International, 2011), national discourse and media attention has been paying attention to problems in schools, for example to pupils' school dissatisfaction, bullying at schools, to growing class sizes, and to problems in teachers' wellbeing. Thus, a brief introduction to challenges and changes faced by the Finnish school system in the 2000's follow.

According to Hargreaves et al. (2007), the corner stone of the success of the Finnish public school system lies in the equality (of the system) and in the trust towards teachers. The economic decline at the end of the first decade of the 2000 had an impact on the resources of the public sector. In the education sector, this became evident through enlarged class sizes, decreases in school networks (i.e., the number of schools within municipalities), and teachers' temporary dismissals. These resource cut backs varied between municipalities (Rajakaltio, 2011). Another major reform was conducted in 2004. In 2004 National Curriculum (Ministry of Education, 2004), special education and general education were no longer separated. Instead, special education was an integral part of comprehensive schooling. The general aim was to provide the extra help as much as possible within general education, and thus de-stigmatize special education.

2.2 Study framework

Potential contributors in explaining differences in sick leave among teachers include differences in individual characteristics of teachers, differences in school setting, and specifically differences in pupil-related psychosocial factors. As illustrated in Figure 1, this study investigated whether pupil-related psychosocial factors, teacher resources at school, and the percentage of pupils with SEN were associated with teacher sick leave, after taking into account the individual characteristics of the teachers and the school setting. Although acknowledging their role in teacher health, teacher personality, teacher coping strategies, and physical school environment are not addressed in this study.

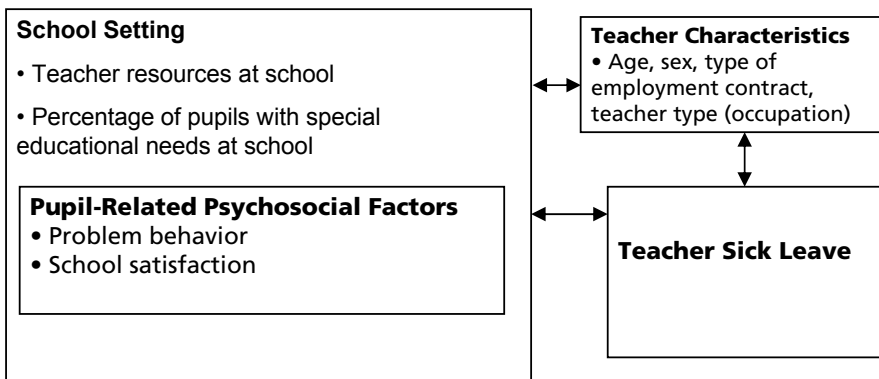


Figure 1. Theoretical framework of the study. Arrows indicate possible associations between examined variables.

2.3 The aims of the study

The aim of this study was to extend understanding of the relationship between teachers' work environment, the school setting, and sick leave, as indicated in Figure 1. The specific study questions were as follows (original articles are referred to with Roman numerals):

1. To what extent are pupil-related psychosocial factors at school associated with teacher sick leave (I, II)?
2. Are there differences in sick leave between general education and special education teachers (III)?
3. Do special education teachers differ from general education teachers regarding health, health behavior, or encountering violence at work (IV)?
4. Is the percentage of pupils with SEN at school associated with teacher sick leave (V)?
5. Is the PTR at school associated with teacher sick leave (V)?
6. Are teacher resources, i.e., PTR at school, an effect modifier between the percentage of pupils with SEN at school and teacher sick leave (V)?
7. Which combination of school contextual factors best explains the variance between schools in teacher sick leave (I, II, III, V)?

3. MATERIALS AND METHODS

3.1 Samples and procedures

Data were obtained from two independent data sources in Finland: the School Health Promotion Study (Kaltiala-Heino et al., 1999; Salmela-Aro, Kiuru, Pietikäinen, & Jokela, 2008), and the Finnish Public Sector Study (FPSS, Kivimäki et al., 2007; Virtanen, Kivimäki, et al., 2010). The nationwide Finnish School Health Promotion Study is a classroom survey which has been carried out every year since 1995. The study covers virtually all eighth and ninth grade classes of lower secondary schools (14 to 16 year old pupils) in Finland, and has been approved by the Ethics Committee of the Pirkanmaa Hospital District. The FPSS focuses on the health of local government personnel, including school personnel, and has been approved by the Ethics Committee of the Finnish Institute of Occupational Health and by the Helsinki and Uudenmaa Hospital District. In the FPSS, annual register data on all work units, job contracts, sick leaves, and workplace characteristics have been collected every year since 2000 (the FPSS survey data is collected at 2 to 4 year intervals). The study links the existing data to data from national health registers. In addition to the 10 towns participating FPSS (Espoo, Vantaa, Tampere, Turku, Oulu, Raisio, Naantali, Valkeakoski, Nokia, Virrat), employer register data for the City of Helsinki was available for the study described in article V. In addition, school-level information on the number of pupils stratified by pupils in general education and special education was collected from school administrations.

The sample of studies described in articles I–III consisted of 90 lower secondary schools which had more than 30 pupil respondents in the School Health Promotion Study and which had also participated

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Table 1. Descriptive characteristics of the study samples by publication.

Characteristics	I	II	III	IV	V
<i>Study sample</i>					
All (n)	2364 2080	2364 2080	2291 2080	5760 4919	8089 7068
General education teachers (n)	211	211	211	841	758
Special education teachers (n)	73	73	-	-	263
Head teachers (n)	29 71	29 71	28 72	22 78	24 76
Men (%)	47 (10)	47 (10)	47 (10)	43 (10)	42 (10)
Women (%)					
Mean age (SD)					
Permanent job contract (%)	78	78	77	80	67
Temporary job contract (%)	22	22	23	20	33
N of schools	90	90	90	384	404
N of pupils	17 033	17 033	17 033	-	124 034
School types	lower secondary	lower secondary	lower secondary	elementary and lower secondary	elementary and lower secondary
N of municipalities	10	10	10	10	11
Data source	registers linked to pupil survey	registers linked to pupil survey	register	survey	register
Study design	cross-sectional	prospective	cross-sectional	cross-sectional	cross-sectional
Exposure	pupil problem behavior	pupil school satisfaction	teacher type	teacher type	school resources and percentage of SEN pupils at school
Outcome	Short- and long-term absence episodes	Short- and long-term absence episodes + diagnosis-specific absences (>9 days)	Short- and long-term absence episodes	Health, health behavior and violent situations at work	Short- and long-term absence episodes (vs. no absences)

Notes: Teacher type refers to special education vs. general education. School resources refer to the pupil-teacher ratio. SEN = special educational needs. Short-term sick leaves were defined as 3 days or less; long-term sick leaves were longer than 3 days.

in the FPSS either in 2004 or in 2005. Pupils' survey response data (n=17 033, response rate 84%) were aggregated to school-level and linked to register data on the teachers (n=2541). Teachers' job tenure, age, sex, job contract, teacher type, and teacher sick leaves were extracted from the employer registers and from the registers of the Social Insurance Institution of Finland. Teachers with less than 0.5 years of service were excluded from the data (n=177) resulting in an analytic sample of 2364 teachers in studies described in articles I and II. In study described in article III, head teachers were also excluded from the analyzed sample, leaving a total of 2291 teachers.

The sample for the study described in the article IV consisted of 5760 basic education (grades 1 to 9) teachers in 384 schools who had responded to the FPSS survey either in 2004 (n=3545) or in 2008 (n=2215). If the respondent had answered both surveys, the 2004 response was chosen. Response rates were 56% in 2004 and 71% in 2008. In study described in the article IV, head teachers were excluded from the sample.

In study described in article V, data from the city of Helsinki were also used. The sample was based on employer register data from the school year 2004–2005. A total of 8089 basic education teachers working in 404 schools with school-level data on PTR and percentage of pupils with SEN at school were included. Schools providing special education only were excluded. The descriptive data on the participants are presented in detail in Table 1.

3.2 Measures

3.2.1 Individual-level measures

Teacher sick leave. In the target organizations, all sick-leave certificates, irrespective of where they were issued, had to be forwarded for recording. For periods up to 3 days (hereafter referred to as short-term sick leaves), employees complete their own certificates. For absences longer than 3 days (hereafter referred to as long-term sick leaves), medical certificates are required. In sub-studies reported in articles I–III, data on sick leaves over a time frame of 3 years (from 1 year before to 1 year after the 2004 or 2005 pupil survey) were obtained from employer registers. The number of contracted days for each teacher, representing “days at risk”, was

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calculated, from which the number of days absent from work for reasons other than sickness was subtracted (articles I–III).

When deciding on the grounds for sick leave, i.e., on patient's work disability, the doctor refers to diagnostic criteria of International Classification of Diseases (ICD) developed by the World Health Organization (WHO). The ICD is the international standard diagnostic classification for all general epidemiological use, for clinical use, and for many health management purposes. It is used to classify diseases and other health problems recorded on many types of health and vital records, including death certificates and health records (WHO, 2012). The most recent version is the tenth revision, ICD-10 (WHO, 1994). The ICD-10 is divided into 22 chapters of diagnosis codes.

The Social Insurance Institution of Finland (SII) pays for compensation for sick leaves lasting more than 9 days. These register data contain sick leaves with associated diagnosis according to the ICD-10 (WHO, 1994). In the sub-study described in article II, register data from the SII on was used. Sick leaves during the survey year and the following year were used as the outcome. To adjust for the baseline absence, the data on sick leaves from one year prior to the pupil survey were used as a covariate. This was considered a robust study design because the pupil surveys were carried out at the beginning of the year (in April).

In the sub-study described in article II, the SII compensated sick leaves with diagnosis codes F00–F99 for mental and behavioral disorders and diagnosis codes of M00–M99 for diseases of the musculoskeletal system and connective tissue were used, as these are the two most common causes for sick leave and early retirement in Finland (Pensola & Gould, 2009). Because both mental and musculoskeletal disorders are broad diagnostic categories including heterogeneous disorders with different etiologies, mental disorders were divided into sub-categories of the most common disorders, i.e., affective disorders (F30–F39) such as depression, and neurotic and stress-related disorders (F40–F48). A study by Wieclaw et al. (2005) found that in the Danish workforce, a high relative risk for affective and neurotic and stress-related disorders was observed among female teachers. Musculoskeletal disorders were divided into subcategories of arthropathies and systemic connective tissue disorders (M00–M36) and dorsopathies (M40–M54).

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In sub-study described in article V, data on teacher sick leave from one school year (September 1 2004 to May 31 2005), excluding teachers with less than 0.5 years of service were used. Since the number of teachers was high enough (n=8089), the sick leave variable in this sub-study was classified as follows: 0=no sick leaves; 1=only short-term absences; 2=long-term absences (with or without short-term absences).

Teacher characteristics. Information about teachers' age, sex, type of job contract (permanent/fixed term) and occupation (general education teacher/special education teacher/head teacher) were obtained from employers registers and used as covariates in the statistical models in all studies, as these are known predictor of health and sick leave among employees (Laaksonen et al., 2010; Virtanen, Kivimäki, Elovainio, Vahtera, & Cooper, 2001; Virtanen, Kivimäki, Elovainio, Vahtera, & Ferrie, 2003).

Teacher health, health behavior, and encountering violence at work. The differences in health, health behavior and exposure to violence at work between general education and special education teachers were examined in sub-study described in article IV. Psychological distress was measured with the 12-item General Health Questionnaire (GHQ-12, Goldberg 1972; Goldberg & Williams, 1988). As suggested in the study validating the GHQ-12 in the Finnish population (Holi, Marttunen, & Aalberg, 2003), a cut-off point of 3/4 was applied to identify workers with psychological distress as follows: respondents rated how much they were affected by each of the 12 symptoms of distress over the previous few weeks (0=not at all, 1=the same as usual, 2=slightly more than usual, or 3=much more than usual). The GHQ-12 was used as a dichotomous measure in which individuals who gave a rating of 2 or 3 on at least 4 out of the 12 were identified as cases of psychological distress. In addition, the respondent was asked if he or she had ever had doctor diagnosed depression or some other mental disorder. With regard to physical health, the question was whether the respondent had ever had a doctor-diagnosed musculoskeletal disorder (osteoarthritis/rheumatoid arthritis/fibromyalgia/sciatica), or disease of the circulatory system (arterial hypertension/heart failure/angina pectoris/myocardial infarction). Health risk behaviors were measured as self-reported weight and height (a body mass index indicating overweight was defined as >25), smoking (nonsmoker vs. smoker), and alcohol intake (alcohol use above the recommended limit [for women 190 g and for men 275 g of

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absolute alcohol/week] vs. not above the limit). Exposure to violence or threat of violence was assessed using self-reports on mental violence (e.g., verbal threats), physical violence (e.g., hitting or kicking), and armed threats (firearm, edged weapon, or striking weapon) at work during the past year (yes vs. no).

3.2.2 School-level measures

Pupil-related psychosocial factors. Pupil problem behavior (article I) was measured using pupil questionnaire responses, which were aggregated to school-level percentages. Pupil problem behaviors were measured through questions on vandalism, bullying, and truancy.

In the pupils' questionnaire, the question assessing vandalism was *"During the past 12 months, have you deliberately damaged or destroyed school property or school building?"* The response scale was 1=never, 2=once, 3=2–4 times, 4=more than 4 times. The aggregate variable *"vandalism at school"* was calculated as the percentage of pupils who reported having damaged school property or school building at least once during the last 12 months. Along this variable, schools were divided into three categories where the prevalence of vandalism was 1) less than 10%, 2) 10 to 15%, and 3) over 15%.

Bullying was defined as follows: *"We say a pupil is being bullied when another pupil, or a group of pupils, say or do nasty and unpleasant things to him or her. It is also bullying when a pupil is teased repeatedly in a way he or she does not like. But it is not bullying when two pupils of about the same strength or power argue or fight. How often have you been bullied during this semester?"* and *"How often you have bullied other pupils during this semester?"* The response scale was 1=several times a week, 2=about once a week, 3=less frequently, 4=never. The school-specific aggregated variable *"bullying at school"* (2 questions) was measured as a sum of (1) the percentage of pupils who reported that they had bullied another pupil and (2) the percentage of pupils who reported that they had been bullied at school at least once a week during the present semester [bullying rate at school (%) = rate of those who were bullying others (%) + rate of those who were victims of bullying (%)]. Along this variable, schools were divided into three categories where the prevalence of bullying was 1) less than 10%, 2) 10 to 15%, and 3) over 15%.

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Truancy was inquired about with the following question: *"How many school days have you missed during the last 30 days because of truancy?"* The response categories were 1=0 days, 2=1 day, 3=2–3 days, and 4=more than 3 days. The aggregated variable *"truancy at school"* was the percentage of pupils who reported that they had skipped school more than once during the last 30 days. Schools were divided according to this variable into three categories where the prevalence of truancy was 1) less than 10%, 2) 10 to 15%, and 3) over 15%.

These cut-off points (<10%;10%–15%;>15%) were roughly based on overall school-level distributions of problem behaviors. Since vandalism, bullying, and truancy represent rather serious forms of problem behavior, and thus under-reporting is more likely than over-reporting, the cut-offs were intended to be sensitive for both extremes of the scales. Roughly 25% of schools had below 10% prevalence in vandalism, bullying, or truancy; roughly 50% of schools had 10%–15% prevalence; and roughly 25% of schools had over 15% prevalence in the areas of problem behavior.

School satisfaction (article II) was measured with the following question (pupil survey): *"How do you feel about going to school at the moment? I like going to school..."* (response scale was 1 to 4, where 1=very much and 4=not at all). The school-level aggregated variable represented the school mean. This variable was divided into tertiles of schools. The first group consisted of schools with the most satisfied pupils (mean score range 2.12 to 2.42), the second group consisted of schools with average levels of school satisfaction (mean score range 2.42 to 2.52), and the third consisted of schools with the lowest levels of school satisfaction (mean score range 2.52 to 2.74).

Pupils with SEN at school (article V). The percentage of pupils with SEN at school was calculated as follows:

$$SEN \text{ pupil percentage} = (\text{number of pupils with special educational needs at school} \div \text{total number of pupils at school}) * 100.$$

The SEN pupil variable was classified into quartiles of 1) <1.2%, 2) 1.2 to 4.9%, 3) 5.0 to 9.5% and 4) >9.5%.

Teacher resources: the PTR. In studies described in articles I and II, the PTR at school was assessed by dividing the number of pupil re-

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spondents in 2004 by teacher person-years in 2004. Pupil respondents/person-years variable was considered to be a proxy for PTR. In study described in article V, the PTR was measured as follows:

$$PTR = \text{number of pupils at school} \div \text{number of teachers in the beginning of the school year.}$$

In article V, the PTR was classified into quartiles of 1) ≤ 12.8 , 2) 12.9 to 15.3, 3) 15.4 to 18.0, and 4) > 18.0 .

Other factors related to the school setting. The pupil cohort socioeconomic composition at school was hypothesized to be a confounding factor between exposure to pupil-related psychosocial risks and teacher sick leave. Pupil cohort socioeconomic composition (articles I and II) was assessed from pupil surveys with a question about the level of education of pupils' parent(s). The aggregated school-level proportion of pupils with parents with no more than a vocational education was derived from this information. The average income level of the residents in the school neighborhood was used as a covariate in study described in article III and in a sensitivity analysis in article IV. This information was obtained from the nationwide register of Statistics Finland and was based on postal zip codes.

Other school factors related to the school setting used as covariates were school size, type of school, and pupil sex distribution at school. In article III, total working hours expressed as person-years were used as a measure of school size. In articles IV and V, the number of pupils at school was used as a measure of school size. When the analysis included several types of schools (articles IV and V), the school type (elementary, grades 1 to 6/lower secondary, grades 7 to 9/comprehensive, grades 1–9) was also controlled for. Furthermore in article II, the sex distribution of pupils at school was obtained from the pupil survey and expressed as the percentage of female pupils. In article III, the staff turnover rate was used as a covariate. Staff turnover rates were calculated as follows:

$$\text{Staff turnover rate} = 1 - (\text{total working hours} \div \text{total number of personnel in 2004}).$$

3.3 Statistical analyses

Because teachers were nested in schools, a multilevel data structure with teachers at the first level, and schools at the second level (GLIMMIX Procedure) was used. In article V, a three-level data structure (teacher—school—municipality) was used. Depending on the outcome variable, logistic, Poisson, negative binomial, or multinomial regression models with a log or generalized logit link function were used to examine the risk of sick leave and to estimate the rate ratios (RR) or odds ratios (OR) with their 95% confidence intervals for categories of predictor variables and covariates (Coxe, West, & Aiken, 2009).

The variance components (random effects) of sick leave episodes were also estimated in all models to assess school-level and/or municipality-level variance. The median mean ratio (MMR) or the median odds ratio (MOR) was calculated to translate this variance into the ratio (RR/OR) scale. The MMR/MOR quantifies the variation between clusters (the second-level/third-level variation) by comparing two persons from randomly chosen different schools. It is the ratio between a person with a higher rate of absence and a person with a lower rate of absence. MMR/MOR is always ≥ 1 . If it is 1, there is no second-level variation (Larsen & Merlo, 2005). All statistical analyses were performed using SAS 9.2 (SAS Institute, Cary, USA).

The primary aim in this study was to examine the relationship between variables describing teachers' psychosocial exposures related to their pupils and to the school setting, and outcome variables (sick leave, health, health behavior). However, when establishing relationships between exposure and outcome variables, it was necessary to consider the roles of other variables in this relationship as well (third variable effects). These (third) variables can have mediating, confounding, suppressing, or moderating effects, and they usually clarify the nature of the relationship between the exposure and outcome (MacKinnon, Krull, & Lockwood, 2000).

A confounding variable is related to two variables of interest (exposure-outcome); it falsely obscures or accentuates the relationship. Confounding effects of other variables were tested in every sub-study (article). A mediator variable specifies how or why an effect occurs, i.e., a mediated effect implies that the independent variable causes the me-

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diator, which in turn causes the dependent variable. Mediation effect occurred for example in article IV, where after adjustment for experiencing mental abuse teacher type was no longer a significant predictor of teachers' psychiatric distress or mental disorders. In other words, working in special education "causes" more experiences of mental abuse which in turn "causes" psychiatric distress and mental disorders.

When the third variable increases the magnitude of the relationship between exposure and outcome variables, it is called suppression. Suppression effect occurred in article V, where the effect of SEN pupil percentage on teacher sick leave increased substantially after adjustment for the covariates. Albeit there are significant conceptual differences, the statistical estimation of effects is similar in all cases of mediation, confounding, and suppression (MacKinnon et al., 2000).

A moderator variable specifies a situation where a certain effect will hold. Moderation was tested (article V) as suggested by Baron and Kenny (1986) with an interaction between the exposure variable (SEN pupil percentage) and a variable specifying the appropriate conditions for its operation (PTR). Moderation was also observed in articles III and IV, where teacher gender moderated the effect of teacher type on the outcome variables (sick leave and encountering violence at work).

4. RESULTS

The main results of this thesis are presented as they pertain to the study questions (please see section 2.2, “Aims of the study”).

4.1 Pupil-related psychosocial factors at school and teacher sick leave

In studies I and II, the overall rate of short-term sick leaves was 1.2 episodes per person year, and the overall rate of long-term absences was 0.4 episodes per person year.

Along with pupil school satisfaction, pupil-reported problem behavior, i.e. vandalism, truancy, and bullying, were examined as pupil-related psychosocial factors. Table 2 shows that teachers working in schools with a prevalence of *pupil vandalism* greater than 15% (n=564) were at a 1.5-fold risk of short-term sick leave compared with their counterparts working in schools with a less than 10% pupil vandalism prevalence (n=805). Moreover, teachers working in schools with a greater than 15% prevalence of *bullying* (n=660) were at a 1.3-fold risk of short-term sick leave compared with their counterparts working in schools with a prevalence of bullying less than 10% (n=646). Truancy was not associated with teacher sick leave, nor was any problem behavior associated with teachers’ long-term sick leaves.

Statistically significant ($p < 0.001$) and rather large (MMR=1.5) variance in teachers’ short-term sick leaves was observed between schools. This school-level variance was mostly affected by the prevalence of vandalism at school, which decreased the variance by 26% (variance 0.15 vs. 0.11). However, even after adjustments for all the covariates, the school-level variance in short-term sick leaves remained statistically significant ($p < 0.001$).

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Table 2. Rate ratios of short-term sick leaves among teachers by prevalence of pupil problem behavior.

	Vandalism at school	Bullying at school	Truancy at school
	Adjusted* rate ratio (95% CI)	Adjusted* rate ratio (95% CI)	Adjusted* rate ratio (95% CI)
Prevalence of <10%	1.00	1.00	1.00
Prevalence of 10–15%	1.05 (0.86, 1.27)	1.19 (0.96, 1.46)	1.03 (0.84, 1.27)
Prevalence of >15%	1.50 (1.20, 1.88)	1.31 (1.04, 1.65)	1.27 (0.94, 1.71)

*Adjusted for teachers' sex, age, employment contract, teacher type, and school-level variables of pupil cohort socioeconomic composition and pupil-teacher ratio.

Table 3. Rate ratios of long-term sick leave among teachers due to any illness, due to mental disorders, and due to neurotic or stress-related disorders by pupil school satisfaction levels.

Pupil school satisfaction	Long-term sick leave >3 days (due to any illness)	Sick leave due to any mental disorder (>9 days)	Sick leave due to neurotic and stress-related disorders (>9 days)
	Adjusted* rate ratio (95% CI)	Adjusted** odds ratio (95% CI)	Adjusted*** odds ratio (95% CI)
High (n=732)	1.00	1.00	1.00
Average (n=855)	1.23 (1.03, 1.47)	1.19 (0.68, 2.09)	1.27 (0.53, 3.03)
Low (n=777)	1.24 (1.04, 1.48)	1.86 (1.08, 3.19)	2.45 (1.08, 5.55)

*Adjusted for teachers' sex, age, employment contract, teacher type, one year prior (>3 days) absences and for school-level variables of pupil cohort socioeconomic composition, pupil-teacher ratio, and pupil sex distribution.

**Adjusted for teachers' sex, age, employment contract, teacher type and for school-level variables of pupil cohort socioeconomic composition, pupil-teacher ratio, and pupil sex distribution.

***Adjusted for teachers' sex, age, employment contract, teacher type, one year prior (>9 days) absences and for school-level variables of pupil cohort socioeconomic composition, pupil-teacher ratio, and pupil sex distribution.

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As shown in Table 3, low levels of pupil school satisfaction were a risk factor for teachers' long-term sick leave. The risk was especially high with regard to absences due to mental disorders, specifically due to neurotic and stress-related disorders, even when adjusting for all prior over 9 days absences. Pupil school satisfaction was associated neither with teacher short-term sick leaves nor to sick leaves lasting over 9 days with musculoskeletal diagnoses.

With regard to school-level variance in teacher long-term sick leaves, there was significant ($p < 0.001$) medium-sized ($MMR = 1.4$) variance between schools. After adjustments for pupil school satisfaction, relevant covariates, and for one year prior over 3 days absences, the variance between schools had decreased by 49% while still remaining statistically significant ($p < 0.001$). In other words, half of the variance between schools in these medically certified, over 3 days absences was explained by the variables included in our models. There was no school-level variance in absences lasting over 9 days.

4.2 Sick leave among special education and general education teachers

In study described in article III, the overall rate of short-term sick leave was 1.1 episodes per person-year and the overall rate of long-term sick leave was 0.4 episodes per person-year. A borderline significant ($p < 0.06$) interaction was found between teacher type (general/special) and sex with regard to short-term absences, and therefore the analyses were performed separately for men and women. In general, women had more both short- and long-term sick leaves than men did. The percentage of short- and long-term absence episodes in general education and special education teachers stratified by sex are presented in Figures 2 and 3.

The rate ratios for sick leave among special education and general education teachers are presented in Table 4. Male special education teachers ($n = 74$) were at a 1.4-fold increased risk of short-term sick leaves compared to male general teachers ($n = 572$). With regard to long-term sick leaves, male special education teachers were at a 1.3-fold risk when compared to male teachers in general education. Among female teachers, there was no excess risk of sick leave for those in special education ($n = 137$) when compared to those in general education ($n = 1508$).

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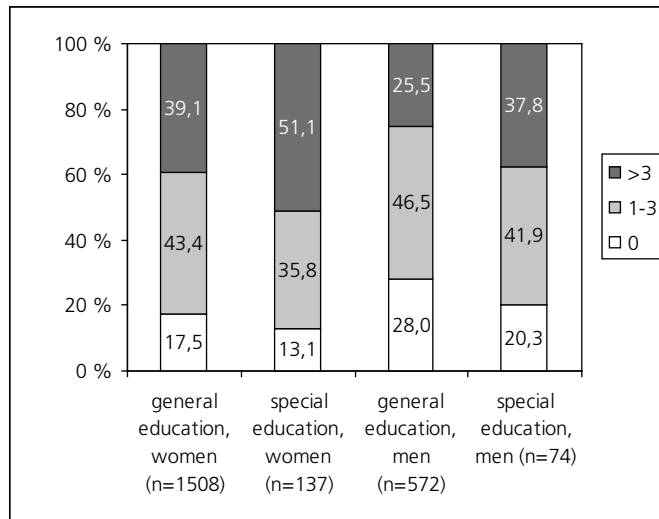


Figure 2. The percentage of short-term sick leave episodes by teacher type and sex during the 3-year study period.

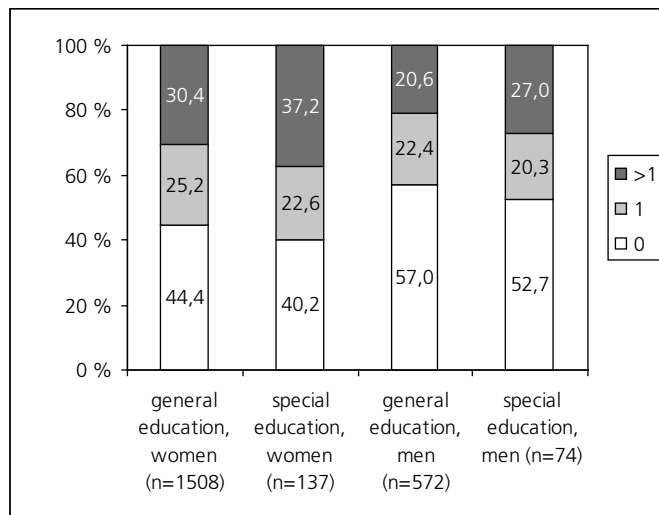


Figure 3. The percentage of long-term sick leave episodes by teacher type and sex during the 3-year study period.

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Table 4. Comparison of rate ratios of sick leave among special education teachers and general education teachers stratified by sex.

	Short-term sick leaves (1–3 days)		Long-term sick leaves (over 3 days)	
	Adjusted* rate ratio (95% CI)		Adjusted* rate ratio (95% CI)	
	Women	Men	Women	Men
General education	1.00	1.00	1.00	1.00
Special education	1.05 (0.95, 1.17)	1.36 (1.15, 1.61)	1.14 (0.97, 1.34)	1.33 (1.01, 1.76)

* Adjusted for teachers' sex, age, and employment contract and for school-level variables of school size, teacher turnover ratio and average school neighborhood income level.

A significant ($p < 0.001$) and rather large ($MMR = 1.4\text{--}1.7$) variance was observed between schools in both short- and long-term sick leaves among teachers. With the exception of male teachers' short-term sick leaves, the school-level variance in teacher sick leave was rather stable and did not change a great deal when individual- and school-level variables were added to the models. The MMR varied from 1.4 to 1.6 and remained statistically significant ($p < 0.001$) in the final models adjusted for relevant covariates. This indicates that the differences between schools in teacher sick leaves are to a large extent explained by factors other than those included in these models.

4.3 Health, health behavior, and exposure to violence at work among special education and general education teachers

The differences in health, health risk behaviors, and exposure to violence or the threat of violence stratified by sex are illustrated in Figures 4–6. Female special education teachers suffered from more psychological distress and musculoskeletal disorders than did their female colleagues in general education. There were no differences in health variables for male general education and special education teachers (Figure 4). Neither were there any differences in health risk behaviors by sex or teacher type (Figure 5). Exposure to violence or its threat was substantially more

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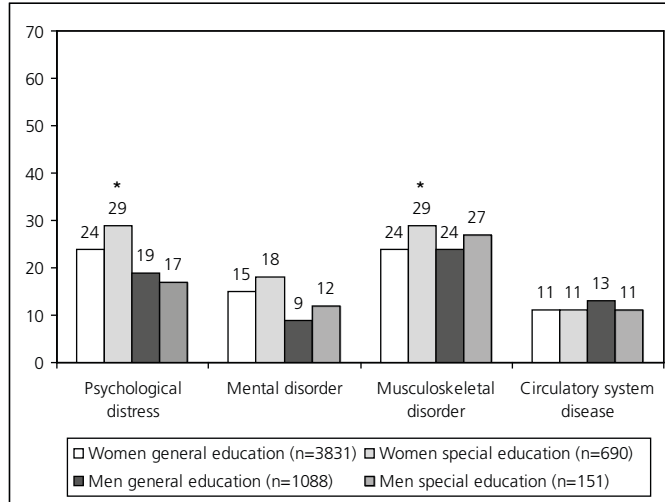


Figure 4. The ill-health of teachers stratified by sex and teacher type. Statistically significant ($p < 0.05$) differences between women and men are marked with an asterisk.

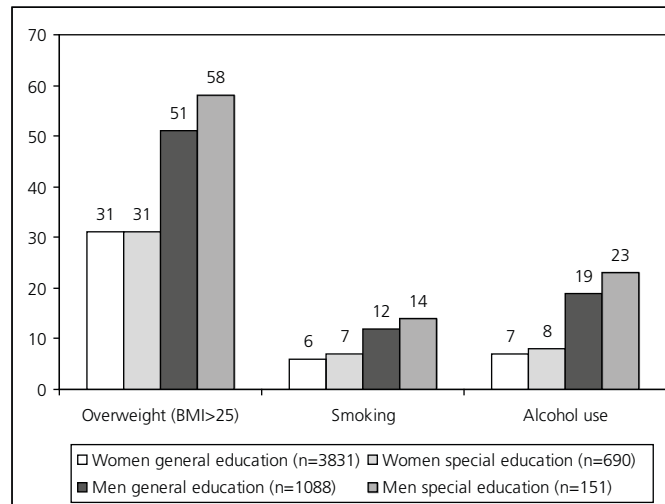


Figure 5. The health risk behaviors of teachers stratified by sex and teacher type. Statistically significant ($p < 0.05$) differences between women and men are marked with an asterisk.

4. RESULTS

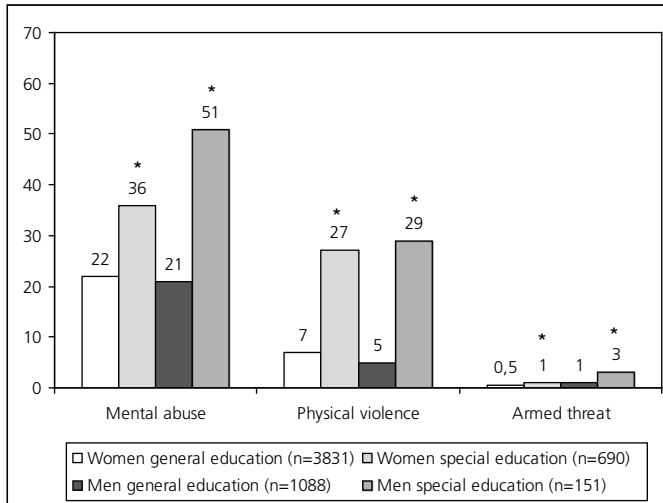


Figure 6. Exposure to violence at work among teachers stratified by sex and teacher type. Statistically significant ($p < 0.05$) differences between women and men are marked with an asterisk.

common among special education teachers than among their colleagues in general education. Exposure to mental abuse was most prevalent among male special education teachers, of which 51% reported mental abuse during the past year (Figure 6).

In the models adjusted for relevant covariates, there were no differences between the health risk behaviors of general education and special education teachers. Furthermore, there was no interaction between teacher type and sex with regard to health variables. The differences in physical and mental health between the two groups were relatively small: special education teachers were at a 1.3-fold risk of psychiatric distress and mental disorders when compared to general education teachers (Table 5). There was no school-level variance in variables related to teacher health. In other words, there were no schools with particularly healthy or unhealthy teachers. Special education teachers did not differ from general education teachers with regard to physical illnesses.

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Table 5. Odds ratios of mental health outcomes in special education teachers compared with general education teachers.

	Psychological distress	Mental disorder
	Adjusted* odds ratio (95% CI)	Adjusted* odds ratio (95% CI)
General education (n=4919)	1.00	1.00
Special education (n=841)	1.28 (1.05, 1.55)	1.32 (1.05, 1.66)

*Adjusted for teachers' sex, age, employment contract and for school-level variables of school size and type.

There was a statistically significant ($p < 0.05$) interaction between teacher type and sex with regard to incidents of mental abuse and physical violence. Thus, the results are presented separately for women and men. Among women, the risk of encountering mental abuse was 1.8-fold and the risk of encountering physical violence was 3.3-fold for special education teachers ($n=690$) when compared to general education teachers ($n=3831$). Among men, special education teachers' ($n=151$) risk of encountering mental violence was 3.3-fold, and that of encountering physical violence was 5.5-fold, when compared to male teachers in general education ($n=1088$) (Table 6). All special education teachers were at a 2.8-fold (95% CI: 1.28, 6.14) risk of encountering armed threat when compared to teachers in general education.

Table 6. Odds ratios of encountering violence by teacher type and sex.

	Mental abuse		Physical violence	
	Adjusted* odds ratio (95% CI)		Adjusted* odds ratio (95% CI)	
	Women	Men	Women	Men
General education	1.00	1.00	1.00	1.00
Special education	1.84 (1.50, 2.27)	3.34 (2.22, 5.03)	3.34 (2.57, 4.36)	5.45 (3.21, 9.25)

*Adjusted for teachers' sex, age, employment contract and for school-level variables of school size and school type.

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With regard to school-level variance in violence, statistically significant ($p < 0.001$) and large ($MOR = 1.6-2.9$) variance was observed between schools in mental abuse and physical violence towards teachers. The school-level variance decreased when adjusting for the covariates and teacher type, but remained statistically significant ($p < 0.001$) and rather large in size ($MOR = 1.5-1.8$). This indicates that while most schools have very little violence towards teachers, schools do exist in which teachers' exposure to violence is common. There were too few cases (39) of armed threat incidents to calculate their school-level variance.

Furthermore, an examination of whether exposure to violence was associated with teacher mental health showed that the risk of psychiatric distress was 1.98-fold (95% CI: 1.68–2.33) if the teachers had experienced mental abuse. Exposure to mental abuse also increased the risk of mental disorders ($OR = 1.38$, 95% CI: 1.13–1.69). Neither exposure to physical violence nor armed threat was associated with teachers' psychiatric distress or mental disorders. When exposure to mental abuse was included in the models, teacher type (i.e., being a special education teacher) was no longer a significant predictor of psychiatric distress or mental disorders. This indicated a mediating effect of mental abuse between teacher type and psychiatric morbidity.

4.4 Pupils with special educational needs and teacher sick leave

The data suggest an increased risk of sick leave among male special education teachers compared to their colleagues in general education. Here, it was examined whether the percentage of pupils with SEN at school is a risk factor for (all) teacher sick leave. The percentage of SEN pupils at school includes pupils integrated fully or partly in inclusive education, i.e., in general education schools.

In this analysis, sick leaves were classified as no sick leaves, short-term sick leaves only, or long-term sick leaves (with or without short-term sick leaves). During the study period from September 2004 to May 2005, 28% of teachers ($n = 2291$) had no sick leave. A total of 41% ($n = 3285$) had short-term sick leaves only, the number of short-term sick leaves ranging from 1 to 15 per person. A total of 31% ($n = 2513$) had long-

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term sick leaves with or without short-term sick leaves (range in the periods of short-term sick leaves was 1 to 20, for long-term sick leaves the range was 1 to 7).

Teachers working in schools with more than 5% SEN pupils were at 1.2- to 1.4 -fold risk for short-term sick leave when compared with teachers in schools with less than 1.2% SEN pupils. Furthermore, the risk for having long-term absences was 1.3- to 1.5 -fold for teachers working in schools with more than 5% SEN pupils (Table 7).

Table 7. Odds ratios of sick leave among teachers by percentage of pupils with special educational needs.

Percentage of pupils with special educational needs at school (quartiles)	Short-term (1–3 days) sick leaves vs. no sick leaves	Long-term sick leaves (with or without short-term sick leaves) vs. no sick leaves
	Adjusted* odds ratio (95% CI)	Adjusted* odds ratio (95% CI)
Less than 1.2% (n=2008)	1.00	1.00
1.2%–4.9% (n=2019)	0.94 (0.80, 1.11)	1.05 (0.87, 1.26)
5%–9.5% (n=2042)	1.22 (1.02, 1.45)	1.27 (1.04, 1.54)
Over 9.5% (n=2020)	1.39 (1.15, 1.68)	1.45 (1.17, 1.80)

*Adjusted for teachers' sex, age, employment contract, teacher type and for school-level variables of school size, school type, and pupil-teacher ratio.

In this analysis, in addition to school-level variance, the variance in teacher sick leave between municipalities was examined. There was significant variance in teacher sick leave both at school-level and at the municipality-level; at both levels the variances were rather small in size (MOR=1.2), and they were no longer significant after adjustments for SEN pupil percentage, PTR, and other relevant covariates.

4.5 Teacher resources and teacher sick leave

Teacher resources at school were measured as the PTR. A PTR above the lowest quartile (>12.8) was associated with a 1.3- to 1.4 -fold risk

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for short-term sick leave. The PTR was not associated with teachers' long-term sick leave (Table 8).

Table 8. Odds ratios of sick leave among teachers by pupil-teacher ratio.

Pupil-teacher ratio at school (quartiles)	Short-term (1–3 days) sick leaves vs. no sick leaves	Long-term sick leaves (with or without short-term sick leaves) vs. no sick leaves
	Adjusted* odds ratio (95% CI)	Adjusted* odds ratio (95% CI)
Less than 12.8 (n=1850)	1.00	1.00
12.9–15.3 (n=2017)	1.26 (1.06, 1.50)	0.98 (0.81, 1.20)
15.4–18.0 (n=2190)	1.35 (1.08, 1.68)	1.14 (0.89, 1.46)
Over 18.0 (n=2032)	1.31 (1.03, 1.69)	1.20 (0.92, 1.58)

*Adjusted for teachers' sex, age, employment contract, teacher type and for school-level variables of school size, school type, and the percentage of pupils with special educational needs at school.

4.5.1 Teacher resources as an effect modifier between SEN pupil percentage at school and teacher sick leave

Earlier it was found that a high percentage of SEN pupils at school may increase teacher sick leave. Here, the aim was to study whether teacher resources, measured as the PTR, moderate this association. The equality of trends according to the percentage of SEN pupils in groups with PTRs below and above the median was tested using a PTR*SEN pupil percentage interaction (Baron & Kenny, 1986; Kraemer et al., 2001).

In the adjusted model, the differences in the risk of short- and long-term absence between PTR groups approached but did not reach statistical significance (P for interaction=0.10). Figure 7 illustrates that when the PTR was below the median (≤ 15.3), the risk for teacher long-term sick leave with a growing percentage of SEN pupils was only 1.07-fold (95% CI: 0.99–1.17). However, when the PTR was above the median (>15.3), an increasing percentage of SEN pupils increased the odds for

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long-term sick leave to 1.22 (95% CI: 1.11–1.33). The risk for short-term sick leave was slightly elevated in both PTR groups (below and above median).

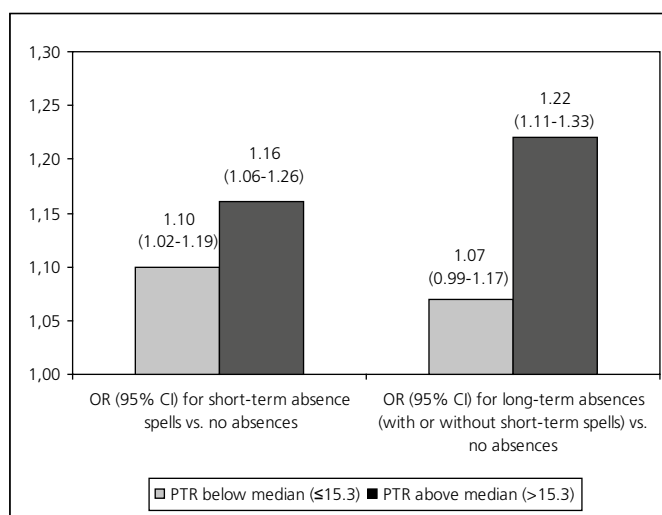


Figure 7. Illustration of the interaction between the pupil-teacher ratio (PTR) and an increase of one quartile in the percentage of pupils with special educational needs at school with teacher sick leave. Adjusted for teachers' sex, age, employment contract, teacher type, and for school-level variables of school size and school type.

4.6 The variance in teacher sick leaves between schools

In this chapter, results regarding school-level variance in teacher sick leave are summarized. Figures 8 and 9 show the school MMRs/MORs of teacher short- and long-term sick leaves in studies I, II, III, and V, first in empty models, and then in final models with teacher- and school-level covariates and predictors. The covariates were slightly different in each of the studies, which along with different predictor variables, explains the differences in the MMR/MOR. Moreover, it should be noted that the

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outcome variable (sick leave) was different in article V than in articles I, II and III.

As shown in Figure 8, the school-level variance in teachers' short-term sick leaves decreased among men when teacher type was added to the model (article III). Inclusion of pupil problem behavior and covariates decreased the school-level variance among both men and women (article I). The most notable decline in school-level variance in short-term sick leaves was observed in study reported in article V, where there was no school-level variance in short-term sick leaves in the final model. In the study reported in article I, the predictor variable (problem behavior at school) alone decreased the MMR to 1.40. Inclusion of the covariates did not actually change the school-level variance. In study V however, the predictor variable (SEN pupil percentage at school) did not change the school MOR, which was 1.17 in the unadjusted model. The decrease occurred only after adding teacher characteristics and the school characteristics of school size, school type, and PTR into the model.

With regard to teachers' long-term sick leave, the best models explaining the variance between schools were those of studies in articles II and V

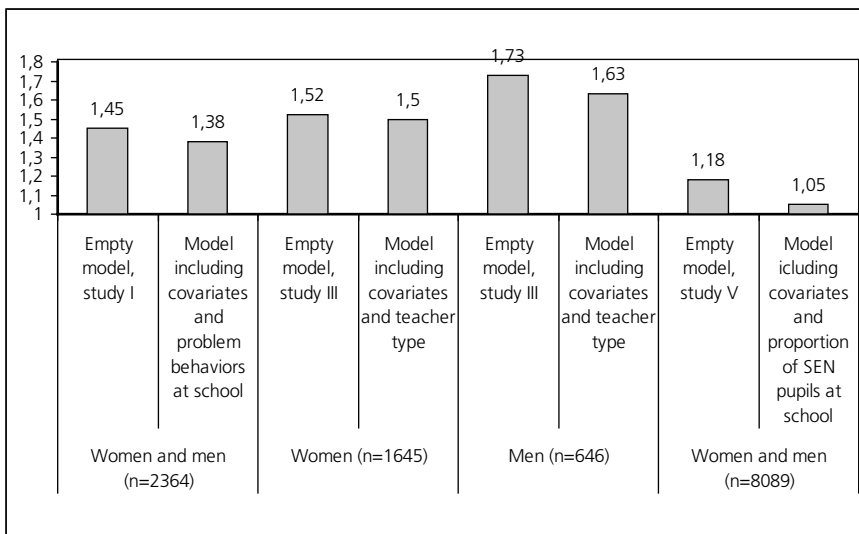


Figure 8. School-level variance in teacher short-term sick leave in studies reported in articles I, III, and V.

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(Figure 9). However, pupil school satisfaction did not alone decrease the school-level variance in long-term sick leaves. In the unadjusted model, the MMR was 1.36 for school satisfaction. The decrease occurred only after adding teacher and school-level covariates into the models. However in article V, adding the SEN pupil percentage to the model decreased the school-level variance/MOR to 1.19, and further adjustments did not actually change the school-level variance further.

To summarize, based on these analyses (Figures 8 and 9), the best combination of teacher and school characteristics in explaining the variance in teachers' short-term sick leave was the one used in article V, where absences were explained with teachers' sex, age, employment contract and teacher type along with school size, school type, the PTR and percentage of SEN pupils at school. The variance in teachers' long-term sick leaves decreased by 49% in article II, where they were explained by teachers' sex, age, employment contract, one year prior long-term sick leaves, and teacher type along with pupil cohort socioeconomic composition at school, the PTR, pupil sex distribution at school, and pupil school satisfaction.

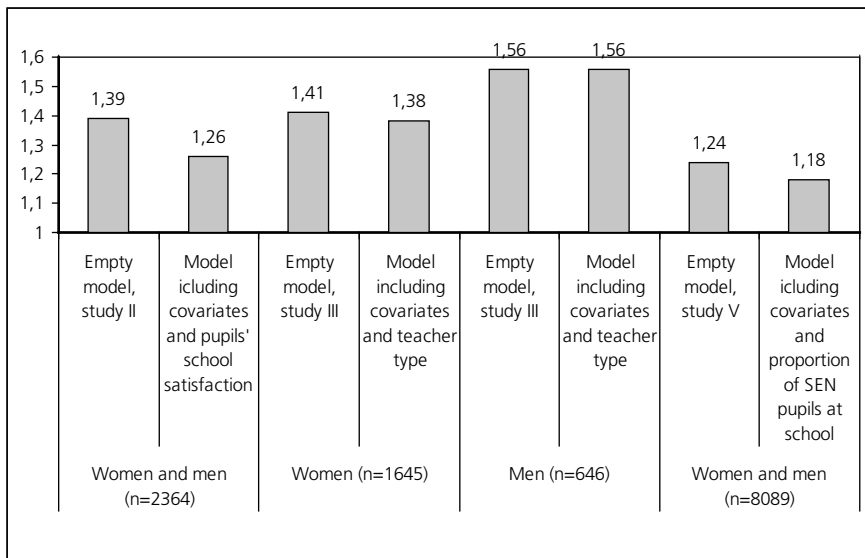


Figure 9. School-level variance in teachers' long-term sick leave in studies reported in articles II, III, and V.

5. DISCUSSION

5.1 Synopsis of the main findings and comparison with previous studies

This study of teachers in Finnish basic education schools showed that there are several pupil-related psychosocial factors as well as other factors related to the school setting that are associated with the risk of teacher sick leave. Pupil-reported problem behavior and school dissatisfaction were associated with teacher sick leave. More specifically, a prevalence of over 15% for pupil vandalism was associated with increased risk for teachers' short-term absences when compared to teachers in schools with less than 10% prevalence for pupil vandalism. Similarly, a prevalence of over 15% for bullying at school was associated with teachers' short-term sick leaves when compared with teachers working in schools with a bullying prevalence of less than 10%. Furthermore, pupils' low school satisfaction increased the risk for teachers' long-term sick leaves, and especially sick leaves due to mental disorders.

Although this study did not assess the experience of stress among teachers directly, the present findings are consistent with several previous studies showing an association between teachers' self-perceptions of pupil problem behavior and teacher stress and burnout (Bauer et al., 2006; Bauer et al., 2007; Borg et al., 1991; Geving, 2007; Hastings, & Bham, 2003; Kovess-Masféty et al., 2007; Kyriakou & Sutcliffe, 1978; Moreno-Abril et al., 2007; O'Connor & Clarke, 1990; Unterbrink et al., 2008). Perceived pupil misbehavior and lack of effort have consistently been associated with teacher stress and burnout in these studies.

Several mechanisms that link pupil problem behavior and teachers' sick leave are plausible. First possible link may be related to direct effect

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of stress. Earlier findings suggest stress to be an important predictor of sick leave, especially due to psychiatric illness (Stansfeld et al., 1997; Kivimäki et al., 2010). Pupils' poor behavior and poor attitudes towards school may lead teachers to have feelings of stress and to have other negative emotions such as frustration and exhaustion, and thus increasing their ill-health (Bellingrath et al., 2009). In support of this hypothesis, female teachers, along with health care professionals, have been found to have the highest relative risk for stress-related psychiatric disorders (Wieclaw et al., 2005).

Secondly, association between stress and health may be mediated by health risk behaviors (Kouvonen, Kivimäki, Virtanen, et al., 2005; Kouvonen, Kivimäki, Elovainio, et al., 2005) which, however, were not in the focus of this study. The third explanation for the present findings relates to reverse causality. From this viewpoint, teacher-pupil interactions are likely to be reciprocal, both influencing each other. Teacher absenteeism may lead to deterioration in the school psychosocial environment, for example, by increasing the workload of other teachers. This may, in turn, increase discipline problems at school, decrease pupils' motivation, and increase feelings of psychological insecurity. Indeed, a poor psychosocial work environment, as evaluated by teachers, was found to be associated with poorer pupil health, poorer academic performance, and increased truancy (Elovainio et al. 2011; Virtanen, Kivimäki, et al., 2009). Schools with poor reputation in terms of discipline problems may be less effective in attracting the healthiest and most qualified teachers (Virtanen, Kivimäki, et al., 2009).

The study gave evidence that a lack of teacher resources at school, as indicated by the PTR, was associated with teachers' short-term sick leaves. A PTR above the lowest quartile (>12.8) was associated with an approximately 30% higher risk for short-term sick leave. Moreover, special education seems to pose an extra challenge for teacher well-being. Special education teachers—especially male special education teachers—were at an excess risk for sick leave and for encountering violence (physical violence and mental abuse) at work. Exposure to mental abuse seemed to mediate the relationship between teacher type and mental health. After adjustment for encountering mental abuse at work, being a special education teacher no longer increased the risk for psychiatric distress or mental disorders. Increasing the percentage of pupils placed

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in special education in general education schools seemed to increase (all teachers' sick leave. Especially when the school had few teacher resources (above median PTR), long-term (>3 days) absences increased with an increasing number of SEN pupils.

Pupils placed in special education more often come from disadvantaged backgrounds (Herring, McGrath, Buckley, & National Center for Education Statistics, 2007 [US]; Department for Education, 2010 [UK]). They also engage more often in delinquent behavior (McIntosh et al., 2008). Thus, a finding with high policy relevance was that teacher well-being may be buffered by adding more teacher resources to vulnerable schools; the risk for teachers' long-term sick leave in schools with an increasing percentage of SEN pupils did not increase as much when the PTR was below the median (<15.3) than when the PTR was above the median. Providing good resources in terms of fewer pupils per teacher seems to promote the well-being of teachers in schools with a high prevalence of SEN pupils.

While pupil vandalism of school property and bullying at school were associated with short-term sick leaves, pupil school dissatisfaction was associated with long-term sick leaves. Furthermore, being a special education teacher and having a high percentage of pupils with SEN at school were positively associated with both short- and long-term sick leaves. Earlier research on sick leaves (Kivimäki et al., 2003; Marmot et al., 1995; Semmence, 1987; Vahtera et al., 2004) has concluded that while long, medically certified sick leaves are more strongly linked to mortality, taking short-term sick leave can have a protective effect against more severe illnesses and even mortality. Because the present study showed a significant association between pupil-related psychosocial factors and teachers' short-term sick leaves, it is possible that teachers use them for coping (Lazarus, 1990; 1993) with stressful work situations (Kristensen, 1991). However, pupil school dissatisfaction also predicted teachers' more severe health problems, especially mental ill-health and stress-related disorders, specifically those within the broad diagnostic category of "neurotic and stress-related disorders", most of which were "reactions to severe stress" or "adjustment disorders".

In each of the sub-studies (articles), statistically significant variance between schools with regard to teacher sick leave was observed. In article V, variation in teacher sick leave was observed also between municipalities.

An earlier multilevel study on teachers' burnout symptoms concluded that very little of the variance in self-reported burnout symptoms was attributable to school-level factors, and that most variance was accounted for by individual differences between teachers, suggesting that individual perceptions of the situation were most predictive of burnout (McCarthy et al., 2009). In contrast, the results of this study suggest that while most of the variance in teachers' sick leave was explained by individual characteristics, the school context was also a significant predictor.

Other multilevel studies on teacher absenteeism have focused on organizational behavior, such as shirking behavior and school-level absence norms, in explaining the between-school variation in absences (Bradley et al., 2007; Gaziel, 2004; Rosenblatt et al., 2010; Shapira-Lischinsky & Rosenblatt, 2010). The results of the present study suggest that there are several other factors related to the school setting that were not accounted for in the previous studies that explain the variation in absence behavior between schools. The present thesis suggests that the schools with the most sick leaves also have more violence, more pupil problem behavior, lower school satisfaction, and more pupils with SEN. After these and other predictors of teachers' sick leaves were included in the models, the variance between schools in teachers' sick leave decreased or even diluted.

5.2 Methodological strengths and weaknesses

The strengths of this study relate to the use of large independent data sets and register data. In articles I and II, data from pupil survey and registers were combined to examine the link between pupil-related psychosocial factors and teacher sick leave. In these analyses, the problem of common method bias (Podsakoff et al., 2003) was avoided by using two independent data sets. Moreover, the school psychosocial environment was assessed using pupils' reports rather than teacher evaluations. The same method has been previously used by Bru, Stephens, and Torsheim (2002). In articles III and V, it was possible to use extensive, reliable register data and to extend understanding about teacher, pupil, and school characteristics associated with teacher sick leave. In article IV,

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the prevalence of health problems, health-risk behaviors, and exposure to violence at work was explored in a large cohort of teachers.

Using register-based data on teachers' sick leaves can be considered to be more valid and reliable than the use of self-report data, since records collected routinely by workplaces minimize the potential recall and response biases attributable to self-reports (Kivimäki et al., 2003). Because municipal employees get paid for days absent due to illness, the recording of days absent is accurate at workplaces.

Another strength of this study is that the findings were based on multilevel modeling taking into account the hierarchical, "nested" structure of the dataset. This allowed simultaneous exploration of teacher sick leave both at the individual level and at the school level. Moreover, this approach allowed for the study of cross-level interactions, such as the interaction between gender (individual level) and violent situations at work (school level).

There are also study limitations to be noted. Firstly, four out of the five sub-studies were cross-sectional, which limits the ability to make causal conclusions. Even in the study reported in article II, with prospective design (baseline sick leaves accounted for), the possibility of reversed causation cannot totally be ruled out. It is thus possible that the temporal order between pupil-related psychosocial factors at school and teachers' sick leave is reversed, or bidirectional. The relationship is likely to be a continual cycle, in which both pupil-related psychosocial factors and teacher sick leaves influence one another. However, these questions remain to be investigated in future studies.

Secondly, the survey data that was based on self-report measures (used in articles I, II, IV) is susceptible to recall and response bias (Kivimäki et al., 2003). The possibility of this causing systematic error in the results is, however, considered to be minor. A systematic error would, for example, occur in a situation where the response bias would not be random, i.e., special education teachers would consistently overestimate their health behavior as better than do teachers in general education. It is more likely that any response bias is randomly distributed between special and general education teachers.

A further shortcoming is that all potential confounding factors of sick leave were not controlled for. For example, teacher income is a potential confounding factor, since sick leave is more common among workers

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with lower income levels (Kristensen, Jensen, Kreiner, & Mikkelsen, 2010; Leinonen, et al., 2011). However, the socioeconomic status of Finnish teachers is relatively high and invariant; all permanent teachers have a Master's degree, and the salaries of municipal sector teachers are based on a collective labor agreement, which leads to little variation in salaries (Local government employers, 2011). Head teachers and special education teachers have higher salaries than do general education teachers, but in this study teacher type was either controlled for or analyses were performed separately for general education and special education teachers. Head teachers were excluded from the data in articles III and IV.

Moreover, teacher health behavior was accounted for only in article IV. This may have added selection bias to the results, since it is possible that teachers with poorer health behavior may be overrepresented in schools with pupil-related psychosocial risk factors. In fact, a previous study on the same cohort as in this study, showed that teachers working in schools in low income school neighborhoods, reported heavier alcohol consumption than did teachers in wealthier school neighborhoods (Virtanen, Kivimäki, et al., 2007). Since pupil-related psychosocial risk factors were more prevalent in schools with lower pupil cohort socioeconomic composition as well as in schools in low income neighborhoods, this kind of conclusion is likely.

Teachers' personality traits, which were not controlled for, may also have an impact on teachers' ability to cope with demanding work situations (Lazarus, 1990; 1993). The association with teachers' external stressors has been found to be the strongest for a negatively oriented personality (negative affectivity) and for passive coping strategies (Montgomery & Rupp, 2005). A negatively oriented personality and a lack of coping resources may expose people to depression and anxiety. Indeed, hostility and neuroticism have been shown to moderate the effects of organizational justice on sick leave among male hospital employees (Elovainio, Kivimäki, Vahtera, Virtanen, & Keltikangas-Järvinen, 2003). Thus, teachers' individual characteristics, such as personality and coping strategies, are likely to have an impact on sick leave. Also family situation, namely work-family conflicts, is likely to influence teachers' occupational health and sick leave (Väänänen, Kumpulainen et al., 2008).

Moreover, the social framework and work group behavior influence the decision on whether to go to work or to stay at home (Väänänen,

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Tordera et al., 2008). Kristensen (1991) proposed that sickness absenteeism (or presenteeism) can be seen as a coping behavior where an employee makes conscious choices within a given social framework. Both positive and negative incentives may affect these decisions. These incentives may include, for example, hope of career advancement, or fear of dismissal or other negative sanctions from colleagues or the management (see also Johansson & Lundberg, 2004; Steensma, 2011; Virtanen, 1994; Virtanen, 2003). However, since in this study the whole study group was teachers, the social framework was rather similar for all the subjects. The type of employment was controlled for in this study. This was important since temporary workers have been found to have lower rates of sick leave, despite poor perceived health, than do permanent employees (Virtanen et al., 2001). However, the school-level variance was controlled for in the studies, and differences in sick leave between schools were still observed, which suggests that the absence culture may vary across schools.

The writing of this thesis has been a learning process, and new ideas have emerged along the way. For example, the outcome of sick leave varies between studies. In articles I–III, the risks for short- and long-term sick leave episodes were examined with separate statistical models. In article V, a multinomial absence variable was used where both short- and long-term episodes were simultaneously compared to having no absences. This method of analysis may be perceived as more sophisticated and appropriate. However, the number of subjects was significantly lower in articles I–III ($n=2291$ to $n=2364$) compared to article V ($n=8089$). Reanalyzing the data used in articles I–III with the multinomial absence variable resulted in somewhat similar results to those reported, but yielded larger confidence intervals, suggesting that the statistical power was inadequate when using the multinomial variable; in articles I and II, there were only 333 teachers (14%) that had no absences during the 3-year study period (data not shown).

Moreover, diagnosis-specific absence data were used in article II, but not in the other sub-studies. In article I, where the effect was significant only with regard to short-term sick leaves, there was no reason to further explore the diagnosis-specific sick leaves of more than 9 days. In article III, the effect of teacher type on long-term sick leaves was significant only among men. Since there were only 646 male teachers in that study, we did not further explore the causes of their sick leaves due to the lack

of statistical power. Finally, diagnosis-specific absences were not used in article V, due to limited data on the causes of sick leaves hampering cause-specific analyses. The diagnosis-specific data were available for two study years only (2004–2005), and were restricted to teachers working outside the city of Helsinki (80% of the study population) and to episodes longer than 9 days (a total of 591 episodes, 6% of all medically certified [>3 days] sick leave episodes). Therefore, we did not include the diagnosis-specific absences in that analysis.

5.3 Implications for future research

As to the evidence that the associations between pupil-related factors and teacher health are causal, I now go back to those criteria proposed by Bradford Hill (Fletcher & Fletcher, 2005) that were enhanced in this study compared to in previous studies. Article II found evidence of temporality, since the design was prospective and prior absences were controlled for. Large relative risks, related to the criterion of strength, were observed especially in article IV; the odds ratios for encountering violence were 3-fold to 5-fold among male teachers in special needs education, and several confounders were adjusted for. In article V, there was evidence of a dose-response relationship between exposure (percentage of SEN pupils at school) and outcome (sick leave).

However, as noted before, these studies were mainly cross-sectional, i.e., not giving evidence for the criterion of reversibility. Therefore, from the methodological point of view, there is a need for longitudinal studies and intervention studies. A longitudinal study design would demonstrate whether a change in for example pupil school satisfaction, or in the PTR, will actually relate to a change in teacher sick leave when baseline level of absenteeism is accounted for. These kinds of study designs would also enhance the robustness of causal conclusions since Bradford-Hill's criteria on reversibility would be met. Moreover, although there are studies on effective interventions, for example, against bullying, they have mostly focused on effects on pupils (Ahtola et al., 2012). Future intervention studies should, in addition to pupil outcomes, include teacher outcomes.

Teacher turnover and attrition are major problems in many countries, such as the US and the UK (for a review see Scheopner, 2010). In

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Finland, teacher turnover is relatively low, but hiring of qualified special education teachers is difficult especially in the Helsinki metropolitan area (OAJ, 2011). Thus, in addition to sick leaves, future studies could use measures of turnover as an outcome variable when evaluating the effects of school environment on teacher well-being and of interventions to improve the school psychosocial work environment.

Although various individual-level confounding factors were controlled for in this study, teachers' personality traits and coping strategies in stressful work situations, which have been shown to associate with psychological health of teachers (Montgomery & Rupp, 2005) were not controlled for. Having an active problem-solving coping strategy was shown to decrease, and an avoidant, passive strategy to increase the risk of sick leave (van Rhenen, Schaufeli, van Dijk, & Blonk, 2008). Moreover, a lack of teacher self-efficacy, meaning a lack of believe that the teacher can influence pupils' performance, may lead to depersonalization (a dimension of burnout: cynicism, excessively detached response to other people) (Brouwers & Tomic, 2000). Future studies should thus adjust the models for these characteristics, and especially focus on the possible moderating or mediating role of these factors in explaining the association between pupil and school characteristics and teacher sick leave.

Pupils' socioeconomic background was measured as parents' level of education or the school neighborhood income levels. Another variable of growing interest is that of immigrant background. OECD statistics (2011) showed that although pupils with immigrant backgrounds often were also socioeconomically disadvantaged, their school performance (reading) was worse than that among native pupils even after controlling for socioeconomic background. However, second generation immigrants tended to outperform first-generation immigrant pupils in reading. The role of immigrant pupils in schools is an important area for future studies, especially regarding the need for teacher resources. As the native population of working age is decreasing all over the developed western world, schools and societies face major challenges in realizing the potential of pupils with immigrant backgrounds (OECD, 2011).

Along with the psychosocial environment, the physical school environment affects both teachers' and pupils' health. For example, studies have shown that poor indoor air quality is associated with pupils' academic achievement and absenteeism (Haverinen-Shaughnessy, Moschan-

dreas, & Shaughnessy, 2011; Mendell, & Heath, 2005; Simons, Hwang, Fitzgerald, Kielb, & Lin, 2010). Thus, future studies should investigate whether problems in indoor air or other aspects of the physical school environment predict teacher health and subsequent sick leave.

5.4 Practical implications

As previous research has shown, the school psychosocial environment may be improved by, for example, increasing both teachers' and pupils' control over their work or their perceptions of justice at schools. From pupils' point of view, increasing their sense of ownership over their schools might reduce vandalism of school property and increase their school satisfaction. Moreover, making teachers' decision-making procedures (ratings of exams, grounds for detention etc.) at school more transparent might enhance pupils' evaluations of teacher justice. This might, in turn, raise pupil school satisfaction. From teachers' point of view, increasing teachers' decision-making latitude and their perceptions of justice of their supervisor and the decision-making procedures at school in general might improve their job satisfaction and thus decrease both voluntary absenteeism, and also stress-related illnesses (involuntary absenteeism).

There are already examples of successful interventions to improve the psychosocial environment at schools, such as the Finnish national anti-bullying program, KiVa. KiVa aims to decrease bullying through a strong emphasis on influencing onlookers who are neither bullies nor victims to show that they are against bullying. Towards this end, the interventions include pupil lessons and an anti-bullying computer game. The actual cases of bullying that come to attention are handled by a team of three teachers (or other members of school staff) in small group discussions with the bullies, victims, and prosocial classmates. The program has shown consistent beneficial effects including reduction in self- and peer-reported victimization and self-reported bullying (Kärnä et al., 2011).

Training of teachers in at-risk schools on classroom management strategies, proactive teaching methods, and other ways of handling problem behavior and physical aggression have yielded positive pupil outcomes such as improved social competence, emotional self-regulation, and fewer conduct problems (Webster-Stratton, Reid, & Stoolmiller, 2008).

Occupational safety and health officials together with school management should conduct early intervention programs for teachers who have taken multiple short-term sick leaves. These early interventions might prevent mental health problems caused by job strain. Investments in these preventive measures can improve both teacher and pupil well-being.

5.5 Conclusions

The aim of this study was to identify pupil-related psychosocial factors in schools that would relate to teacher sick leave, and hence facilitate the development of evidence-based ways to enhance the well-being of teachers.

The results of this thesis are consistent with the conclusion that pupil-related psychosocial factors are linked to teacher sick leave. In addition to their impact on teacher health, school psychosocial environments are likely to influence pupil health as well, which suggests that the school psychosocial environment may be shared by both pupils and teachers (see also Elovainio et al., 2011; Virtanen, Kivimäki, et al., 2009).

Moreover, this thesis implicates that among teachers there is a high-risk subgroup—male teachers in special education—in need of effective ways to cope with their demanding work. In order to reduce these teachers' ill-health, their exposure to violence at work should be reduced, and training to handle violent situations should be organized. This training should not, however, be exclusive to male special education teachers only. Along with actions to reduce violence at schools, all teachers should be trained to handle violent situations effectively.

At the same time, the findings of this thesis suggest that more resources are needed at vulnerable schools. Since various forms of problem behavior and delinquency often reflect the more general societal situation of the community in which the school is located, such behaviors are difficult to eliminate by means of school-level interventions without addressing resources that are needed to solve those problems. Vulnerable schools need more teacher resources, as well as special education teachers, school psychologist, school health promotion staff, and pupil counseling staff. The increases in support staff would enable teachers to concentrate on their basic task, that of education.

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School is the work environment of teachers and the learning environment of pupils. During school hours, teachers and pupils are in constant interaction with each other, so it is plausible that their well-being is inter-related.

This study examines the association between pupil-related psychosocial factors, the school setting, and teacher sick leave. The general framework is based on work stress models that propose that psychosocial factors affect health when demands of the psychosocial work environment exceed the resources of the employee.

The results of this study suggest that pupil-related psychosocial factors, such as pupils' problem behavior, school dissatisfaction, and violent or threatening situations in schools, affect teacher health as reflected by their taking sick leave. Attention should focus on teacher well-being, especially in schools characterized by such stressors.

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