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Psychosocial work characteristics, recovery, and health-related outcomes in teaching

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ACADEMIC DISSERTATION

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ABSTRACT

Occupational stress in teaching concerns not only teachers; it also impacts on wider social contexts. It may negatively affect teachers' health, but also indirectly influence students' health and their academic achievements. Yet, despite the challenges teacher stress and health problems pose for society, little research has examined and compared the relevance of different psychosocial work characteristics in predicting poor teacher health, or explored mechanisms that explain or moderate these associations in the teaching profession. This thesis examined the associations between different psychosocial work characteristics and health-related outcomes among Finnish teachers, as well as the potential explanatory (i.e., mediating) and moderating mechanisms for these associations.

The data were gathered via self-report questionnaires and included a cross-sectional sample of primary school teachers from the Helsinki metropolitan area of Finland and a longitudinal sample of teachers in primary or secondary education from the prospective Finnish Public Sector study. Psychosocial work characteristics involved job strain, effort-reward imbalance, organizational injustice, and teacher-targeted violence. The health-related outcomes potentially associated with psychosocial work characteristics included depressive symptoms, burnout, and sleep problems. In addition, the extent to which different aspects of recovery explained the associations and the moderating role of organizational justice were examined. The data were analyzed using regression-based methods of inference.

Psychosocial work characteristics in terms of effort-reward imbalance and, to a lesser extent, with regard to job strain, were found to be relevant predictors of poor health in teaching. Effort-reward imbalance was associated with higher levels of burnout and, compared with job strain and organizational injustice, this was the most important predictor of depressive symptoms. Job strain was associated particularly with impaired sleep. Although organizational injustice did not seem to be a major predictor of poor health, high organizational justice represented a valuable resource in the teachers' psychosocial work environment. More specifically, justice played a moderating role in the association between exposure to workplace violence and increased risk of sleep problems. Encountering violence at work had the most pronounced effect on sleep among teachers working in relatively unjust conditions, whereas the sleep of those perceiving high organizational justice was not affected by violence.

Some of the effects of psychosocial work characteristics on health were mediated through aspects of recovery; namely, through sleep and recovery experiences during leisure time. Non-restorative sleep partially explained both the association of job strain with depressive symptoms and the association of effort-reward imbalance with depressive symptoms and overall burnout score. Furthermore, the association between effort-reward imbalance and burnout (in terms of reduced professional efficacy) was partially mediated through poor relaxation during leisure time. The indirect effects were relatively weak, suggesting that although poor recovery may

partly mediate the association between psychosocial work characteristics and health-related outcomes in teaching, it does not play a major role in the process.

For teachers in basic education, reducing the demanding aspects of the psychosocial work environment and increasing the rewarding elements, such as the respect and support they receive, may be important in occupational stress prevention. Furthermore, although preventive measures against teacher-targeted violence should be prioritized, resources aimed at promoting organizational justice in schools may also mitigate the adverse consequences of teacher victimization. Although improving teachers' psychosocial work environment is probably the most important means of supporting their health, interventions that help teachers unwind after working hours and reduce sleep problems may further complement workplace development programs.

TIIVISTELMÄ

Työstressin vaikutukset opetuslalla eivät rajoitu yksinomaan opettajiin vaan ulottuvat koskettamaan myös laajempaa ympäristöä. Työstressillä voi olla epäsuotuisia vaikutuksia paitsi opettajien terveydelle myös oppilaiden hyvinvoinnille ja heidän oppimistuloksilleen. Opettajien työstressin ja terveysongelmien asettamista yhteiskunnallisista haasteista huolimatta verrattain vähän on toistaiseksi tutkittu sitä, mitkä opettajan työn psykososiaaliset tekijät ovat merkittävimmin yhteydessä heikentyneeseen terveyteen ja millaiset tekijät voivat selittää tai muovata tätä yhteyttä opettajan ammatissa. Tämä väitöskirja tarkastelee työssä psykososiaalista kuormitusta aiheuttavia tekijöitä ja niiden yhteyksiä terveyteen suomalaisten opettajien keskuudessa. Lisäksi väitöskirja arvioi työn psykososiaalisten tekijöiden ja terveyden välistä yhteyttä mahdollisesti selittäviä ja muovaavia tekijöitä.

Väitöskirjan aineisto koostuu pääkaupunkiseudun luokanopettajien työhyvinvointitutkimuksen yhteydessä kerätystä poikittaisaineistosta ja valtakunnallisen Kunta10 -tutkimuksen pitkittäisaineistosta. Tutkimukseen osallistuneet opettajat työskentelivät perusopetuksen piirissä. Tarkastellut psykososiaalista kuormitusta aiheuttavat tekijät käsittivät epätasapainon työn vaatimuksissa ja hallinnassa, ponnisteluiden ja palkkioiden epäsuhtaan, organisatorisen epäoikeudenmukaisuuden ja opettajiin kohdistetun väkivallan. Opettajien terveyttä mitattiin itsearvioitujen masennusoireiden, työuupumuksen ja uniongelmiin avulla. Työn psykososiaalisten tekijöiden ja terveyden välisen yhteyden selittäjinä tarkasteltiin erilaisia palautumiseen liittyviä tekijöitä. Lisäksi arvioitiin organisatorisen oikeudenmukaisuuden muovaavaa vaikutusta tässä yhteydessä.

Työn psykososiaalisista tekijöistä etenkin ponnisteluiden ja palkkioiden epäsuhta mutta jossain määrin myös epätasapaino työn vaatimuksissa ja hallinnassa oli yhteydessä heikentyneeseen terveyteen opettajien keskuudessa. Koettu ponnisteluiden ja palkkioiden epäsuhta oli yhteydessä työuupumukseen ja verrattuna muihin tarkasteltuihin tekijöihin se ennusti merkittävimmin opettajien masennusoireita. Epätasapaino työn vaatimuksissa ja hallinnassa oli sen sijaan yhteydessä erityisesti opettajien uniongelmiin. Organisatorinen epäoikeudenmukaisuus ei tutkimuksen tulosten mukaan ollut merkittävä heikentyneen terveyden riskitekijä opetuslalla, mutta korkea oikeudenmukaisuus osoittautui tärkeäksi resurssiksi opettajien työympäristössä. Epäoikeudenmukaisessa työympäristössä väkivallan kohteeksi joutuminen kasvatti uniongelmiin riskiä, kun taas oikeudenmukaisessa työympäristössä vastaavaa kohonnuttua uniongelmiin riskiä ei esiintynyt.

Palautumiseen liittyvät tekijät, kuten uni ja työstä palautumisen kokemukset selittivät joitain työn psykososiaalisten tekijöiden ja terveyden välisiä yhteyksiä. Puute unen virkistävyudessa selitti osittain sekä työn vaatimusten ja hallinnan epätasapainon yhteyttä masennusoireisiin että ponnisteluiden ja palkkioiden epäsuhtaan yhteyksiä masennusoireisiin ja työuupumuksen kokonaispistemäärään. Puutteellinen rentoutuminen vapaa-ajalla selitti osittain ponnisteluiden ja palkkioiden epäsuhtaan yhteyttä työuupumukseen. Epäsuorat yhteydet työn

psykososiaalisista tekijöistä puutteellisen palautumisen kautta heikentyneeseen terveyteen olivat kuitenkin kohtalaisen heikkoja. Tämä viittaa siihen, että vaikka puutteellinen palautuminen voi osittain selittää työn psykososiaalisten kuormitustekijöiden ja heikentyneen terveyden välistä yhteyttä opettajan ammatissa, sillä ei ole merkittävää roolia tässä prosessissa.

Perusopetuksessa työskentelevien opettajien työstressin ennaltaehkäisyssä olennaista vaikuttaisi olevan työn vaatimusten vähentäminen ja toisaalta työn palkitsevuuden kasvattaminen esimerkiksi lisäämällä opettajien saamaa tukea ja arvostusta. Vaikka opettajiin kohdistuvan väkivallan torjuminen tulee asettaa etusijalle, organisatorisen oikeudenmukaisuuden varmistaminen kouluissa voi osaltaan lieventää väkivallan haitallisia seurauksia opettajien keskuudessa. Opettajien työympäristön kehittämisen ohella interventiot, jotka edistävät vapaa-ajalla tapahtuvaa rentoutumista ja parantavat unen laatua, voivat olla hyödyksi opettajien terveyden tukemisessa.

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Kia Gluschkoff

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ABBREVIATIONS

CI	Confidence interval
COR	Conservation of Resources theory
DSM-IV	Diagnostic and statistical manual of mental disorders, 4th edition
E-R	Effort-Recovery theory
ERI	Effort-reward imbalance
FPSS	Finnish Public Sector study
MBI-GS	Maslach Burnout Inventory-General Survey
OAJ	Trade Union of Education in Finland
REQ	Recovery experience questionnaire
RR	Risk ratio

LIST OF ORIGINAL PUBLICATIONS

This thesis is based on the following publications:

- I Gluschkoff, K., Elovainio, M., Keltikangas-Järvinen, L., Hintsanen, M., Mullola, S., & Hintsanen, T. (2016). Stressful psychosocial work environment, poor sleep, and depressive symptoms among primary school teachers. *Electronic Journal of Research in Educational Psychology*, 14(3), 462-481. doi: 10.14204/ejrep.40.16067

- II Gluschkoff, K., Elovainio, M., Kinnunen, U., Mullola, S., Hintsanen, M., Keltikangas-Järvinen, L., & Hintsanen, T. (2016). Work stress, poor recovery and burnout in teachers. *Occupational Medicine*, 66(7), 564–570. doi: 10.1093/occmed/kqw086

- III Gluschkoff, K., Elovainio, M., Hintsanen, T., Pentti, J., Salo, P., Kivimäki, M., & Vahtera, J. (2017). Organisational justice protects against the negative effect of workplace violence on teachers' sleep: a longitudinal cohort study. *Occupational and environmental medicine*, 74(7), 511–516. <http://doi.org/10.1136/oemed-2016-104027>.

The publications are referred to in the text by their roman numerals. They are reprinted with the kind permission of the copyright holders.

1 INTRODUCTION

Teachers play a vital role in establishing a classroom environment that promotes positive developmental and academic achievements among students. However, occupational stress and poor teacher health have become concerns that are adversely affecting the educational system and, ultimately, society in general. This also holds true also for Finland, where, according to the latest report by the Finnish Trade Union of Education (OAJ; 2016), the work ability of teachers has fallen below the national average. More than half of Finnish teachers experience work overload, and one-third of them report frequently feeling stressed and exhausted in their work. Moreover, compared with many other professions, teachers in Finland are often exposed to workplace violence and threatening situations (Finnish Institute of Occupational Health, 2016).

The current thesis examined psychosocial work characteristics in association with health-related outcomes among Finnish teachers, and the mechanisms explaining or moderating the associations. Psychosocial work characteristics referred to stressful factors in the psychosocial work environment in terms of job strain, effort-reward imbalance, organizational injustice, and workplace violence against teachers. In addition to examining organizational injustice as a stressful characteristic in the psychosocial work environment, high organizational justice was investigated as a protecting factor of the effects of workplace violence against teachers. The health-related outcomes potentially associated with psychosocial work characteristics included depressive symptoms, burnout, and sleep problems. The potential explanatory mechanisms mediating the effects of psychosocial work characteristics on health covered various aspects of recovery. By disentangling the complex associations of different psychosocial work characteristics, recovery, and health, the thesis aimed to facilitate the development of effective stress interventions for teachers – and eventually, to support a classroom environment that fosters beneficial student outcomes.

Finnish government spending on education comprises a sizeable share of the total state budget¹, providing a compelling rationale to promote health and well-being in the teaching profession. The personal, societal, and financial costs associated with the unfavorable effects of teacher stress are too high to ignore. Whereas the health consequences of occupational stress in teaching include, for example, depression, burnout, and general mental distress (Bauer et al., 2007; Montgomery & Rupp, 2005; Steinhardt, Smith Jaggars, Faulk, & Gloria, 2011), it is also associated with increased turnover intentions, absenteeism, and desire for early retirement (Onnismaa, 2010; Wilson, 2002). Most alarmingly, occupational stress in teaching can be socially contagious. This means that it not only affects teachers, but can also extend further to

¹ In Finland, the government co-finances the cost of education through transfers to local authorities. The Ministry of Education and Culture budget amounts to 13% of the total state budget, and around 10% of this (763 million euros) is annually allocated to early childhood and general education.

impact the students with whom teachers interact on a daily basis. Teachers' mental health problems have been linked to, for example, poor academic achievements (McLean & Connor, 2015) and elevated levels of students' biological stress markers (Oberle & Schonert-Reichl, 2016). Moreover, students whose teachers feel unsupported in their work appear to experience more learning, externalizing, interpersonal, and internalizing problems (Milkie & Warner, 2011). Occupational stress, therefore, not only impairs teacher health but can also have an indirect influence on students' future health and socio-economic standing.

A large part of the current evidence on the contribution of psychosocial work characteristics to poor health in other professions is lacking in its limited generalizability to teaching. Traditional work stress models focusing on, for example, work demands and control may not capture all the relevant aspects of the psychosocial work environment in teaching, as the profession entails a considerable amount of social interaction as well as a great deal of independent decision-making and professional freedom. It is also worth noting that a rather typical characteristic of the teacher's psychosocial work environment, workplace violence, has largely been ignored in studies examining how psychosocial work characteristics are associated with health outcomes.

Moreover, some of the previous evidence linking psychosocial work characteristics to certain health indicators may not be directly applicable to the teaching profession. For instance, although sickness absence rates are typically regarded as a fairly reliable way of measuring occupational health, psychosocial work characteristics might not predict sickness absences in teaching in the same way as they do in other occupations. This is because sickness presenteeism is very high in teaching, and the majority of teachers come to work despite being ill (Aronsson, 2000; Dudenhöffer, Claus, Schöne, Letzel, & Rose, 2016).

Although research has also been carried out specifically in the teaching profession, it may be limited by a variety of factors. Some previous investigations, for example, have focused solely on the association between student misbehavior and teacher health (Dicke et al., 2014; Friedman, 1995; Hamre, Pianta, Downer, & Mashburn, 2007). Studies examining a wider range of work characteristics are often cross-sectional and have not typically used well-established instruments to measure characteristics of the psychosocial work environment (Burke, Greenglass, & Schwarzer, 1996; Ferguson, Frost, & Hall, 2012; Kokkinos, 2007; Steinhardt et al., 2011; Vercambre, Brosselin, Gilbert, Nerrière, & Kovess-Masféty, 2009). Notably, it is also unclear to what extent results from these studies can be applied in or extended to the Finnish teaching profession. Furthermore, to date, very few studies have examined features of teachers' psychosocial work environment as potential contributors to differences in health outcomes using measures that are more commonly employed in large-scale epidemiological studies.

To conclude, much of the current evidence on the associations between psychosocial work characteristics and impaired health is limited in scope and might be poorly generalizable to the teaching profession in general, and to Finnish teachers in particular. A more comprehensive understanding of the factors in the psychosocial work environment that contribute to poor health among teachers would facilitate the design of effective workplace development programs tailored for teaching.

Furthermore, when developing stress management strategies for teachers, it is also necessary to move beyond targeting the direct associations between psychosocial work characteristics and health. Specifically, awareness of the possible indirect processes that mediate the effects of the psychosocial work environment on health, as well as insights into the potential moderators of this association may be valuable in attempts to promote teacher health and well-being. With this in mind, the focus next turns to concepts of the psychosocial work environment, and the potential mediating (i.e., explanatory) and moderating mechanisms in the relationship between the psychosocial work environment and health.

1.1 PSYCHOSOCIAL WORK CHARACTERISTICS AND HEALTH

1.1.1 STRESSFUL PSYCHOSOCIAL WORK ENVIRONMENT

Job strain, effort-reward imbalance, and organizational injustice

Psychosocial work environment refers to the psychological, social, and organizational characteristics of the workplace. These characteristics are typically regarded as potential stressors in the work environment that can adversely influence employee health and well-being. The majority of prior research on the harmful effects of a stressful psychosocial work environment has focused on two theoretical models: The *job strain* model (also known as the demand-control model) and the *effort-reward imbalance* model (ERI). Although the two models share similar characteristics of the psychosocial work environment, their focus differs: the job strain model pays attention to the job content and power structure at work, whereas the ERI model also considers the social and economic aspects of work.

The job strain model is, without a doubt, the most widely used conceptualization of a stressful psychosocial work environment in epidemiological studies. In the model, the combination of high work demands and low control results in occupational stress (Karasek & Theorell, 1990; Karasek, 1979). Work demands refer to the extent to which the workload or the pace of work is high and the tasks are challenging. Control, or decision latitude, refers to employees' authority to make decisions, control over the pace of work, and possibilities to use creativity or skills at work. According to the model, high work demands act as stressors, but high control can alleviate the strain caused by the demands (Karasek, 1979). Having control not only buffers the development of strain when demands are high, but also fosters psychological well-being and feelings of mastery and confidence. Whereas the combination of high demands and low control results in job strain, high demands coupled with high control is described as an active job that potentially leads to increased motivation (Theorell & Karasek, 1996).

The ERI model represents an alternative conceptualization of stressful psychosocial work characteristics. The model is based on the principles of social exchange and posits that occupational stress arises from non-reciprocity between high efforts spent and low rewards received (Siegrist, 1996; Siegrist et al., 2004). Efforts are defined as demanding aspects of the work, such as having time pressure, a lot of

responsibility, and experiencing many interruptions and pressure to work overtime. Rewards include monetary incentives, but also job security and career development opportunities. In the ERI model, receiving esteem, that is, getting respect and support from the others, is also an integral part of rewards at work. Compared to the job strain model, according to which it is the high demands that are perceived as stressful, the ERI model postulates that lack of reciprocity, or mismatch, between “costs” and “gains” (i.e., effort and reward) causes strain and may lead to poor health.

More recently, the concept of *organizational justice* has also been documented as an important characteristic of the psychosocial work environment. It complements both the job strain and the ERI model (Ndjaboué, Brisson, & Vézina, 2012) by focusing on the extent to which employees are treated with fairness at the workplace (Moorman, 1991). Justice at work comprises distributional, procedural, and interpersonal elements: distributional justice refers to the perceived fairness of reward and resource allocation; procedural justice to the fairness of decision-making processes; and interactional justice to the respectful interpersonal treatment and truthfulness of communication by management to employees (Colquitt, Conlon, Wesson, Porter, & Ng, 2001; Greenberg, 1990). In accordance with the ERI model, the employment relationship is viewed as a social exchange also in the organizational justice literature. Specifically, fair treatment of employees is proposed to be associated with the quality of social exchange relationships in the organization, which, in turn, is linked to positive employee attitudes and behaviors (Tekleab, Takeuchi, & Taylor, 2005).

Along with job strain and ERI, organizational injustice (that is, lack of justice) is currently recognized as a significant work-related psychosocial health risk (Elovainio, Kivimäki, & Vahtera, 2002; Kivimäki, Elovainio, Vahtera, Ferrie, & Theorell, 2003; Robbins, Ford, & Tetrick, 2012). All three of these psychosocial work characteristics have been linked to psychological distress or mental disorders (Bonde, 2008; Harvey et al., 2017; Nieuwenhuijsen, Bruinvels, & Frings-Dresen, 2010). Specifically, moderately strong evidence suggests that job strain is associated with the development of depression, although ERI and organizational injustice have also been identified as consistent risk factors for various poor mental health outcomes (Siegrist, 2008; Stansfeld & Candy, 2006; Theorell et al., 2015). Evidence also points to a dose-response association between psychosocial work characteristics and health; for example, repeated exposure to job strain is suggested to lead to a twofold risk of depression (Stansfeld, Shipley, Head, & Fuhrer, 2012).

Characteristics of the psychosocial work environment have also been robustly associated with the risk of heart disease (Belkic, Landsbergis, Schnall, & Baker, 2004; Hintsala et al., 2010; Kivimäki et al., 2006, 2012). In a study of female health care professionals who were followed up for 10 years, those with job strain (high demand, low control) were 38% more likely to experience a cardiovascular event than those who reported no job strain (Slopen et al., 2012). Similarly, a prospective study of civil servants found that high ERI increased the incidence of coronary heart disease events by 36% during 11 years of follow-up (Kuper, 2002). With regard to organizational justice, perceptions of high justice (as compared to lower levels of justice) have been shown to reduce the risk of coronary heart disease by 35% in a nine year follow-up study among civil servants (Kivimäki et al., 2005).

The salience of job strain, ERI, and organizational injustice in predicting health outcomes seems, however, to depend on the unique features of a profession or occupational sector. More specifically, whereas job strain has been associated with poor health especially amongst blue-collar employees, ERI and organizational injustice are suggested to influence employee health more widely across different occupations (Calnan, Wadsworth, May, Smith, & Wainwright, 2004; Herr et al., 2015). In the public sector, organizational injustice in particular has been consistently associated with health problems (Elovainio et al., 2009; Elovainio, Kivimäki, Vahtera, Keltikangas-Järvinen, & Virtanen, 2003; Hietapakka et al., 2013; Ylipaavalniemi et al., 2005).

Among teachers, perceptions of ERI have been recently linked most strongly to poor health (Loerbroks et al., 2014; Wang et al., 2014), suggesting that the ERI model might be particularly relevant when examining the effects of a stressful psychosocial work environment on teachers. These findings are, however, limited in two ways. Firstly, they are based on Chinese teachers, and their generalizability across different cultures is not established. Secondly, they have not simultaneously considered job strain, ERI, and organizational injustice as potential work-related determinants of poor teacher health. It is, therefore, currently unknown, which of the three widely studied characteristics of psychosocial work environment is most relevant in explaining health outcomes in the teaching profession.

With regard to Finnish teachers, very little information is available on the association between psychosocial work environment and teacher health. Nevertheless, the relevance of the job strain model has received some support for predicting health among Finnish teachers: Job strain has been associated with a higher level of burnout (Santavirta, Solovieva, & Theorell, 2007) and a higher body mass index (Kouvonen, Kivimäki, Cox, Cox, & Vahtera, 2005), which is a risk factor for a wide range of adverse health outcomes. However, in the Finnish teaching profession, the effects of ERI and organizational injustice on health remain poorly understood.

Teacher-targeted violence

In addition to the more traditional conceptualizations of a stressful psychosocial work environment, teacher-targeted violence has emerged as a significant source of stress for individuals working in education. A recent report by the Finnish Trade Union of Education (The Trade Union of Education in Finland, 2016) reveals an alarming message about the increasing prevalence of teacher-targeted violence in Finland: Up to 21% of teachers in basic education had experienced violence in their work during the last 12 months, and the rate of these violent encounters is on the rise. Similar concerns are expressed in the Finnish Public Sector study (FPSS; 2016), according to which teachers encounter violence and threatening situations considerably more frequently than many other public sector employee groups.

Although teachers may experience aggression from their colleagues or their students' parents, the most typical source of teacher-targeted violence is the students themselves (Martinez et al., 2015; The Trade Union of Education in Finland, 2016). Milder forms of student misbehavior, such as vandalism at school, has been linked to teachers' short-term sickness absences (Ervasti, Kivimäki, Puusniikka, et al., 2012). Actual violence towards teachers has been associated with health outcomes such as

poor emotional and psychosomatic well-being (LeBlanc & Kelloway, 2002). However, prior research on the consequences of teacher-targeted violence is limited by cross-sectional designs, and the association of workplace violence with teacher health has not been explored in longitudinal studies.

1.1.2 FAVORABLE PSYCHOSOCIAL WORK ENVIRONMENT

Although the characteristics of the psychosocial work environment may have unfavorable effects on employee health, they can also act as *protecting or buffering factors* that moderate the effects of occupational stress. High organizational justice, for instance, is suggested to be a favorable resource in the psychosocial context of work (Elovainio et al., 2005). This view is based on van den Bos and Lind's (2002) Uncertainty management model, according to which individuals become more sensitive to fairness in unpredictable conditions. The model posits that perceptions of justice can either remove feelings of uncertainty or alleviate the stress and discomfort associated with it. Correspondingly, employees have demonstrated an ability to cope better with stressors at work in a fair work environment (Proost, Verboon, & van Ruyseveldt, 2015), and high organizational justice has been documented to alleviate stress symptoms related to, for example, shift work and fixed-term employment (Heponiemi et al., 2013). Another explanation for the protective role of justice is that treating employees justly induces feelings of trust (Colquitt & Rodell, 2011), which may buffer against the negative effects of occupational stress (Harvey, Kelloway, & Duncan-Leiper, 2003).

With regard to teacher-targeted violence, the majority of studies addressing this issue have merely explored its negative outcomes, and fewer studies have tried to identify the factors that could protect teachers from the adverse consequences of violence at work. However, a recent cross-sectional study discovered that workplace violence against teachers was associated with negative outcomes only when teachers' satisfaction with how the violence was handled by the school was low, not when it was high (Fox & Stallworth, 2010). It thus appears that factors related to fairness in terms of organizational justice might influence teachers' reactions to encountering violence at work. Nevertheless, the role of organizational justice as a buffer against the harmful effects of workplace violence remains unexamined in the teaching profession.

1.2 RECOVERY AND HEALTH

1.2.1 RESOURCE LOSS AND ITS CONSEQUENCES FOR HEALTH

Although the traditional conceptualizations of a stressful psychosocial work environment outlined above focus on describing stressful work characteristics, they fail to make statements regarding how exposure to stressful work characteristics may lead to poor health. This process is theoretically explained in the Conservation of

Resources theory (COR; Hobfoll, 1989, 2001), one of the leading theories on stress. A basic tenet of COR theory is that people strive to retain and protect important resources. Some of these are personal resources, such as time, health, skills, and positive feelings, whereas others include more external features of the environment, such as autonomy, social support, feedback, and rewards. The theory states that stress and subsequent health problems develop when important resources are threatened, lost, or not gained after resource investment. In the context of working life, resources may be threatened or lost in unfavorable working conditions.

One of the main principles of COR theory is that resource loss is disproportionately more salient than resource gain and, consequently, has a stronger impact on health. Losses or gains can also snowball into cycles, in which the initial change in resource results in further loss or gain. From the perspective of COR theory, severe reactions to occupational stress, such as burnout, occur as a result of this kind of resource depletion or cycle of losses (Westman, Hobfoll, Chen, Davidson, & Laski, 2004).

1.2.2 RECOVERY PROCESS

The concept of recovery is closely related to COR theory, as successful recovery from stress involves resource restoration or resource gain. By definition, recovery refers to activities that repair the negative effects of stress and restore lost resources (Demerouti, Bakker, Geurts, & Taris, 2009). It is described as a process of psychophysiological unwinding, the opposite to the activation of the sympathetic nervous system and the hypothalamic-pituitary-adrenal (HPA) axis during stressful conditions (Geurts & Sonnentag, 2006). In addition to limiting resource loss, recovery can also create new personal resources that improve resistance to stress. Overall, recovery by gaining resources is considered important because it can stop, counteract, or even prevent the detrimental effects of resource loss.

With regard to occupational stress, a stressful psychosocial work environment not only increases the need for recovery; it can also impair the recovery process (Kinnunen & Feldt, 2013; Sonnentag & Fritz, 2015; Van Laethem, Beckers, Kompier, Dijksterhuis, & Geurts, 2013). In this case, work-related resource loss is not prevented or counteracted by resource gain but instead, the individual's resources are left drained or continue to drain. This in turn can have direct implications for employee health. Consequently, researchers have hypothesized that *poor recovery* might be a mediator of the relationship between stressful psychosocial work characteristics and health-related outcomes (Meijman & Mulder, 1998). Poor recovery's potential role of linking stressful psychosocial work environment and employee health is the next focus of this section.

1.2.3 POOR RECOVERY AS A MEDIATING PATHWAY - EFFECTS OF SLEEP AND RECOVERY EXPERIENCES

According to the Effort-Recovery theory (E-R; Meijman & Mulder, 1998), poor recovery acts as a pathway from acute to more chronic stress. The theory proposes that work demands and effort expenditure at work lead to short-term physiological and psychological load reactions, which are, initially, reversible. Without sufficient recovery, these reactions may, however, accumulate into impaired health. The inadequately recovered employee has to invest compensatory efforts to perform at work, and the increased stress from these compensatory efforts places even higher demands on the subsequent recovery process (Geurts & Sonnentag, 2006).

It has been argued that, rather than occupational stress itself, the most important element in the development of chronic health problems is insufficient recovery from occupational stress (Söderström, Jeding, Ekstedt, Perski, & Åkerstedt, 2012). It is possible that, in stressful occupations such as teaching, recovery might play a crucial role in supporting health – but that a lack of it may result in the development of poor health. Compared with many other professions, teachers not only report more symptoms of occupational stress and mental distress (Johnson et al., 2005) but also experience poor recovery in terms of higher levels of sleep deprivation (Amschler & McKenzie, 2010). Clarifying the role that recovery plays in the association between psychosocial work characteristics and teacher health could, therefore, contribute significantly to the prevention of health-related problems among teachers.

Sleep

Prior research indicates that sleep is one of the recovery-related pathways through which psychosocial work characteristics may affect health (Åkerstedt, 2006). Sleep is considered a fundamental part of recovery: Good quality sleep in sufficient amounts helps to complete the recovery process and maintain physical and mental health. More specifically, sleep restores alertness, memory capacity, and mood, but also regenerates the central nervous system, metabolic system, endocrine system, and immune system (Åkerstedt, Nilsson, & Kecklund, 2009).

The role of stressful psychosocial work environment as an antecedent of sleep problems is well documented (Van Laethem et al., 2013; Åkerstedt, Nordin, Alfredsson, Westerholm, & Kecklund, 2012), as is the association between impaired sleep and poor health (Baglioni et al., 2011; Jansson-Fröjmark & Lindblom, 2010). However, a stressful psychosocial work environment can severely compromise recovery by having an adverse effect on sleep. Specifically, working in stressful conditions causes physiological activation and increased cognitive arousal, which can transfer the negative effects of stress into sleep (Berset, Elfering, Lüthy, Lüthi, & Semmer, 2011; Cropley, Dijk, & Stanley, 2006). Stressed individuals, who are in most need of recovery, may thus find unwinding increasingly difficult (Sonnentag, Arbeus, Mahn, & Fritz, 2014).

Thus far, the view of sleep as a mediator that links psychosocial work characteristics with poor health has received support from two studies. First, organizational injustice was reported to predict minor psychiatric morbidity among Finnish hospital employees, partly through impaired sleep (Elovainio et al., 2003).

More recently, a Swedish longitudinal cohort study showed that sleep problems explained the relationship between high job demands and prospective depressive symptoms (Magnusson Hanson, Chungkham, Åkerstedt, & Westerlund, 2014). Although teachers' experiences of stressful psychosocial work environment have been linked to poor sleep quality (Cropley et al., 2006), the mediating role of sleep in the association between psychosocial work characteristics and poor teacher health remains to be investigated.

Recovery experiences

In addition to sleep, unwinding during leisure time contributes to the overall recovery process and a lack of it is considered another potential pathway linking stressful psychosocial work characteristics to impaired health. Sonnentag and Fritz (2007) distinguish between four types of leisure time recovery experiences as strategies for recuperating from occupational stress: Detachment, relaxation, mastery, and control over leisure time. *Detachment* (disengaging mentally from work) and *relaxation* (activities that relax the body and mind) promote overall recovery because they imply that no further strain is placed on the same functional systems that were drained during working hours. *Mastery* (acquiring new skills by seeking challenging experiences and learning opportunities) and *control over leisure time* (deciding which activities to pursue when unwinding, as well as when and how to pursue them) support recovery by building up new resources. In terms of the tenets of COR theory, detachment and relaxation can prevent resource loss, whereas mastery and control indicate resource gain.

Of the four recovery experiences, Sonnentag and Fritz (2015) emphasize detachment as the core recovery experience, as it has potentially strong associations with both occupational stress and health. In addition to its association with poor detachment, a stressful psychosocial work environment has shown to also hinder recovery by predicting low levels of relaxation and control during off-job time (Kinnunen & Feldt, 2013; Sonnentag & Fritz, 2015). As for the mediating role of recovery experiences, poor detachment is suggested to explain the association of psychosocial work characteristics with exhaustion and fatigue (Kinnunen, Feldt, Siltaloppi, & Sonnentag, 2011; Sonnentag, Kuttler, & Fritz, 2010). Thus far, in the context of Finnish teachers' psychosocial work environment and health, the mediating role of recovery experiences has not been explored.

2 AIMS OF THE STUDY

This thesis examined the associations between psychosocial work characteristics and adverse health-related outcomes in Finnish primary and secondary school teachers' occupation. It also investigated the mediators (i.e., recovery) and moderators (i.e., aspects of organizational justice) of the effects of psychosocial work characteristics in order to support more successful ways of preventing illness and promoting health among teachers working in basic education. The psychosocial work characteristics potentially associated with health-related outcomes, as well as the mediating or moderating mechanisms that possibly explain or modify the associations are outlined in **Figure 1**. Based on the gaps and shortcomings in the previous research discussed above, the following four aims were formulated.

1) The first aim was to compare the contributions of three well-validated models of stressful psychosocial work environment (job strain, effort-reward imbalance, and organizational injustice) to explaining depressive symptoms among teachers (Study I).

- Which characteristic of the psychosocial work environment is most strongly associated with depressive symptoms in the teaching profession?

2) Secondly, the study aimed to examine the extent to which aspects of recovery, such as sleep and recovery experiences, mediate the association between stressful psychosocial work environment and depressive symptoms and burnout (Studies I & II).

- What is the role of recovery in linking psychosocial work characteristics to depressive symptoms and burnout in teaching?

3) Thirdly, the study investigated whether workplace violence against teachers is associated with sleep problems (Study III).

- Does encountering violence at work increase teachers' sleep problems?

4) Finally, the study examined the potential moderating role of organizational justice in the association between workplace violence against teachers and sleep problems (Study III).

- Can high organizational justice mitigate the effect of teacher-targeted violence on sleep?

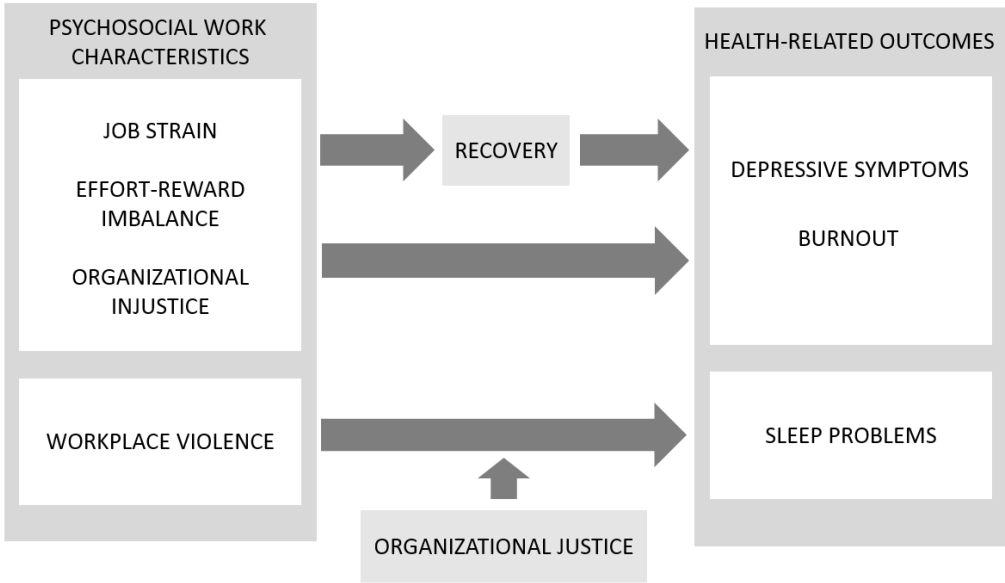


Figure 1. Focus of the study.

3 METHODS

3.1 STUDY DESIGN AND PARTICIPANTS

Table 1 shows the study design and basic characteristics of the participants. Studies I and II used a cross-sectional sample of primary school teachers from the Helsinki metropolitan area of Finland. Questionnaire data were collected during 2013–2014 from a randomized selection of primary schools ($N = 48$) representing around 25% of the total 189 primary schools in the area. First, the school principal was contacted to obtain permission for the study. Nine of the 48 selected schools declined the invitation to participate. A total of 39 schools granted permission to deliver the questionnaires, and 34 schools participated in the study. The questionnaires were delivered in unmarked envelopes to the teachers' post boxes in the middle of the school term. There were only a few participants from each school, and the roughly estimated response rate per school varied from 4 to 31%. It was not possible to obtain a precise response rate for the study, because limited information was available on the number of primary school teachers per school and turnover in teaching personnel during the data collection period. The final sample comprised 76 primary school teachers who taught grades one through six (7- to 12-year-old students).

Data for Study III were drawn from the prospective Finnish Public Sector study (FPSS). The FPSS is an ongoing cohort study of municipal employees working in ten towns and five hospital districts in Finland (Vahtera et al., 2010). First, we identified participants who worked as teachers in primary or secondary education and who reported encountering a violent event in their work during any of the study waves between 2004 and 2014 ($N = 6\ 274$). If a participant reported encountering violence in multiple waves, the first wave with a violent event was selected as the timing of the event. Sleep was measured in three waves with 2-year intervals: The wave preceding exposure to violence, the wave of actual exposure, and the wave following the exposure. The participants with information on sleep from at least the wave of exposure to violence and complete information on other measures were selected to form the primary study sample ($N = 4\ 988$). All the main analyses were, however, also replicated in a sensitivity analysis that included only the participants with information on sleep from at least the wave preceding exposure to violence and the wave of reported exposure ($N = 1\ 056$). Using a supplementary sample of teachers who did not report exposure to violence at work, the sleep of teachers reporting a violent event and the sleep of teachers without a violent event were also compared (for those who did not report encountering violence, a non-event year was randomly assigned to represent the timing of the event). Response rate for the FPSS ranged from 65% to 70%. Ethical approval for the FPSS was obtained from the ethics committees of the Hospital District of Helsinki and Uusimaa and the Finnish Institute of Occupational Health.

Table 1. Study design and basic characteristics of the samples.

	Studies I and II	Study III
Study design	Cross-sectional	Longitudinal
Setting	Primary school	Primary and secondary school
Mean age (SD)	43.95 (10.10)	42.76 (9.53)
Women (%)	66 (87%)	3 841 (77%)
Men (%)	10 (13%)	1 147 (23%)
Sample size	76	4 988

Note. SD = standard deviation.

3.2 MEASURES

Job strain (Study I)

Job demands were measured using a 5-item scale (e.g., “Is your work emotionally demanding?”) and job control using a 9-item scale (e.g., “I can make independent decisions in my work”) from the Job Content Questionnaire (Karasek, 1985). The items were rated on a 5-point scale ranging from either 1 = never to 5 = all the time, or 1 = does not suit me at all to 5 = suits me very well. A job strain indicator was formed by subtracting the mean job control score from the mean job demands score (Hintsanen et al., 2005). The Job Content Questionnaire scales have demonstrated good internal consistency and factorial validity, and substantial predictive validity in a number of studies (Karasek et al., 1998; Kivimäki et al., 2012).

Effort-reward imbalance (Studies I and II)

Effort-reward imbalance was measured using the original ERI measure (Siegrist, 1996). The effort scale consisted of five items (e.g., “I have constant time pressure due to a heavy workload”) and the reward scale had 11 items (e.g., “Considering all my efforts and achievements, I receive the respect and prestige I deserve at work”). Responses were given on a 5-point scale ranging from 1 = does not suit me at all to 5 = suits me very well. Effort-reward imbalance was calculated as the ratio between effort and reward as follows: $\text{Effort}/(\text{reward} \times \text{correction factor})$ (Siegrist et al., 2004). The correction factor adjusts for the unequal number of items in the two scales. The ERI measure has demonstrated good internal consistency, discriminant validity and criterion validity in a comparison across different working populations in Europe (Siegrist et al., 2004). The construct validity of the Finnish ERI scale has also been previously documented (Kinnunen, Feldt, & Mäkikangas, 2008).

Organizational justice (Studies I and III)

Study I used a short 8-item questionnaire to assess overall organizational justice (Elovainio, Heponiemi, et al., 2010). Examples of the items include: “Have you been able to express your views and feelings during procedures used to arrive at your

outcome?”, “Has the authority figure who enacted the procedure treated you with dignity?”, and “Does your outcome reflect the effort you have put into your work?”. The items were rated on a 5-point scale ranging from 1 = totally disagree to 5 = totally agree and reverse-coded so that a high score reflected conditions of organizational injustice. This short measure of justice has demonstrated satisfactory psychometric properties in terms of internal consistency and criterion validity (Elovainio, Heponiemi, et al., 2010).

Study III assessed the procedural and interactional dimensions of organizational justice by items derived from Moorman’s study (Moorman, 1991). The 7-item procedural justice scale indicates perceived fairness of managerial procedures, such as consistency, bias suppression, accuracy, correctability, representativeness, and the ethicality of the procedures (Leventhal, 1980). The 6-item interactional justice scale measures the perceived quality of interpersonal treatment, such as the extent to which managers treat employees with kindness and in a truthful manner (Bies & Moag, 1986). Responses were given on a scale ranging from 1 = strongly disagree to 5 = strongly agree. Mean scores for both justice dimensions were first obtained, after which the participants were divided into high, intermediate, and low justice groups using a tertile split (Elovainio, Kivimäki, et al., 2010; Kouvonen et al., 2007). In previous studies, this measure of organizational justice has been shown to predict various health-related outcomes, such as sleep problems and minor psychiatric morbidity (Elovainio et al., 2009, 2013; Kivimäki et al., 2003).

Workplace violence (Study III)

Exposure to workplace violence (including the threat of violence) was assessed by asking whether the participant had encountered threatening behavior (e.g., vandalism of property, verbal threats), physical violence (e.g., kicking, hitting), or armed threats (e.g., with a firearm or other weapon) during the preceding year (Ervasti, Kivimäki, Pentti, et al., 2012). The response format was either “yes” or “no”.

Depressive symptoms (Study I)

Depressive symptoms experienced during the past two weeks were self-rated, using with the 21-item Beck Depression Inventory-II (Beck, Steer, & Brown, 1996). Each item includes four response alternatives coded from 0 to 3 (e.g., from “I don’t cry any more than usual” to “I used to be able to cry, but now I can’t cry even though I want to”). Possible total scores range from 0 to 63, higher scores corresponding to higher levels of depressive symptoms. The BDI-II has demonstrated high internal consistency, good test-retest reliability, and criterion validity across a variety of populations (Beck & Steer, 1984; Beck et al., 1996; Dozois, Dobson, & Ahnberg, 1998).

Burnout (Study II)

The Maslach Burnout Inventory-General Survey (MBI-GS) was used to assess burnout (Schaufeli, Leiter, Maslach, & Jackson, 1996). The MBI-GS includes 16 items (e.g., “I feel emotionally drained from my work”) that measure three dimensions of burnout: Exhaustion (five items), cynicism (five items) and reduced professional efficacy (six items). Responses were given on a 7-point scale ranging from 0 = never to 6 = daily, reflecting the frequency of burnout symptoms. Mean scores were obtained for each

burnout dimension, and a total burnout score was calculated as a weighted sum ($0.4 \times \text{exhaustion} + 0.3 \times \text{cynicism} + 0.3 \times \text{reduced professional efficacy}$). The weights were obtained by a discriminant analysis in an earlier study (Kalimo, Pahkin, Mutanen, & Toppinen-Tanner, 2003) using a representative sample of Finnish working people. The three-factorial validity of the MBI-GS has been supported in different occupations and nations (Leiter & Schaufeli, 1996; Schutte, Toppinen, Kalimo, & Schaufeli, 2000).

Recovery experiences (Study II)

The 16-item Recovery Experience Questionnaire (REQ) was used to assess four dimensions of recovery experiences; namely, detachment, relaxation, mastery, and control over leisure time (Kinnunen et al., 2011; Sonnentag & Fritz, 2007). The REQ measures each dimension with four items (e.g., “I don’t think about work at all”, “I do relaxing things”) that are rated on a scale ranging from 1 = totally disagree to 5 = totally agree. Mean scores were obtained for the four recovery experiences. The Finnish REQ has demonstrated good reliability and construct validity in Finnish employees (Sitaloppi, Kinnunen, Feldt, & Tolvanen, 2011).

Sleep problems (Studies I–III)

Sleep problems were examined using the 4-item Jenkins sleep problem scale (Jenkins, Stanton, Niemcryk, & Rose, 1988). The participants were asked to rate on a 6-point scale, ranging from 0 = not at all to 5 = every night (in Study III, from 1 = never to 6 = nearly every night), how often during the previous four weeks they had experienced difficulties falling asleep, woken up several times per night, had difficulty staying asleep (including waking far too early), and woken up feeling tired and worn out after the usual amount of sleep. The items correspond to the DSM-IV diagnostic symptoms for sleep disturbances by measuring three components of sleep problems: The first item measures sleep onset problems, the second and third measure sleep maintenance problems, and the fourth measures non-restorative sleep. In Studies I and II, the three components of sleep problems were analyzed separately as continuous variables. In Study III, a mean score consisting of all the items was obtained and the resulting score was dichotomized as “no disturbed sleep” (no symptoms or symptoms no more than once a week) and “disturbed sleep” (symptoms at least two to four times a week, reflecting a clinically significant level of sleep disturbance) (Roth, 2007). The Jenkins sleep problems scale has demonstrated good internal consistency and test-retest reliability (Jenkins et al., 1988).

Covariates

Age and gender were used as covariates in all studies. These are potential confounders because they have been associated with responsiveness to the effects of a stressful psychosocial work environment (Kudielka, Buske-Kirschbaum, Hellhammer, & Kirschbaum, 2004) and various health problems (Bebbington et al., 2003; Ohayon, 2002). In Study II, the number of total working hours was also entered as a covariate to control for potential confounding in the associations between stressful psychosocial work environment, recovery, and health (Shields, 1999). Because the participants represented the same occupation, there was no need to control for socioeconomic status; they had attained a similar level of education and income.

Cronbach's alphas were determined to assess internal consistency, i.e., the reliability of the scales (**Table 2**). With few exceptions, they were within an acceptable range, i.e., 0.70 or higher.

Table 2. Reliabilities (Cronbach's alphas) of the scales.

Scale	Cronbach's alpha	Study
Job strain:		
Job demands	0.70	I
Job control	0.62	I
Effort-reward imbalance:		
Effort	0.64	I, II
Reward	0.79	I, II
Organizational justice (short measure)	0.87	I
Procedural justice	0.93	III
Interactional justice	0.93	III
Depressive symptoms	0.90	I
Burnout:		
Exhaustion	0.92	II
Cynicism	0.88	II
Reduced professional efficacy	0.77	II
Recovery experiences:		
Detachment	0.82	II
Relaxation	0.88	II
Mastery	0.85	II
Control	0.92	II
Sleep problems	0.77 to 0.80	III

3.3 STATISTICAL ANALYSES

The analyses were performed using SPSS Statistics 22.0 (Studies I and II) and Stata 13 statistical software (Study III) (Stata Corporation, College Station, TX). Studies I and II used series of linear regression analyses to examine the associations between the variables. In Study I, the analyses were first conducted separately for each psychosocial work characteristic, and then by entering them into a joint model using relative weight analysis (Tonidandel & LeBreton, 2011). Relative importance refers to “the proportionate contribution each predictor makes to R^2 (i.e., amount of variance explained), considering both its direct effect (i.e., its correlation with the criterion) and its effect when combined with the other variables in the regression equation” (Johnson & Lebreton, 2004, p. 240). Compared to standardized beta weights, the proportionate contribution estimates provide more precise information on the importance of multiple predictors when they are correlated.

Indirect effects (i.e., mediation) were examined in Studies I and II by bootstrapping with a PROCESS macro (Hayes, 2013). The analyses were conducted separately for each potential mediator (that is, for each recovery experience and sleep problem variable). Bootstrapping is the preferred method for assessing indirect effects because it makes no assumptions about the shape of the distributions of the variables or the normality of the sampling distribution, and it can be applied to even small sample sizes (Preacher & Hayes, 2008). Bootstrapped confidence intervals based on 10 000 resamples were used to determine the significance of the indirect effect. The mediated proportion was expressed as a ratio of indirect effect to total effect.

Study III used binary log-binomial regression with generalized estimating equations (GEE; Lipsitz, Kim, & Zhao, 1994) to examine whether workplace violence against teachers was associated with an increased risk of disturbed sleep. The GEE method is not sensitive to missing measurements and takes into account the within-person correlation between sleep measurements over time. The effect of violence on sleep was examined by calculating risk ratios (RRs) and their 95% confidence intervals (CIs) for sleep disturbances at the time of the violent event and post-event compared to the pre-event baseline. The moderating effect of organizational justice was studied by first entering the main effect of justice and then the interaction terms “time × justice” to the model. The hypothetically most favorable condition (high justice) was selected as a reference category. The two organizational justice dimensions (i.e., procedural and interactional justice) were analyzed separately.

4 RESULTS

The observed associations are summarized in **Table 3** and presented in more detail in the following paragraphs.

Table 3. Summary of observed associations.

Predictor	Depressive symptoms	Burnout	Poor recovery experiences	Sleep problems
Job strain	(+)			+
Effort-reward imbalance	+	+	+	+
Organizational injustice	#			(+)
Workplace violence				+
Poor recovery experiences		+		+
Sleep problems	+	+	+	

Note. + = positive association; (+) = weak or inconclusive positive association; # = no association; blank space = the association was not examined.

4.1 PSYCHOSOCIAL WORK ENVIRONMENT, DEPRESSIVE SYMPTOMS, AND SLEEP PROBLEMS (STUDY I)

Study I first examined the associations of job strain, ERI, and organizational injustice with depressive symptoms. The majority of teachers (56%) experienced high ERI (effort-reward ratio > 1). Experiences of high job strain (job strain indicator > 0) were much less uncommon (16%) and, compared with previous findings among municipal employees, the level of perceived organizational justice was moderate (Perko & Kinnunen, 2013). When the associations between the characteristics of the psychosocial work environment and depressive symptoms were analyzed in separate models, both job strain and ERI emerged as significant predictors of higher depressive symptoms ($\beta = 0.33$, $p = 0.006$ and $\beta = 0.40$, $p < 0.001$, respectively). There was no association between organizational injustice and depressive symptoms ($\beta = 0.12$, $p = 0.315$).

Next, the extent to which poor recovery in terms of sleep problems mediates the observed associations was investigated using bootstrap mediation analysis. The results showed that non-restorative sleep explained 18% of the association of job strain with depressive symptoms ($\beta_{\text{indirect}} = 0.06$, 95% CI 0.004 to 0.167) and 11% the

association of ERI with depressive symptoms ($\beta_{\text{indirect}} = 0.05$, 95% CI 0.003 to 0.133) (**Figure 2**). Sleep onset problems or sleep maintenance problems did not mediate the observed associations.

It is worth noting that unlike the more traditional mediation analysis methods (see Baron & Kenny, 1986) that are no longer recommended by methodologists, bootstrapping does not rely on significance criteria for the individual paths in a mediation model (Hayes & Rockwood, 2016). Accordingly, the path from non-restorative sleep to depressive symptoms was not significant when job strain or ERI was controlled for (see **Figure 2**), but this is not relevant to whether the indirect effect through non-restorative sleep is or is not significant.

Including job strain, ERI, and organizational injustice in a joint model revealed that, of these psychosocial work characteristics, ERI was the strongest and only significant predictor of depressive symptoms. Together, psychosocial work characteristics explained around 24% of the total variance in depressive symptoms. According to relative weight analysis (**Table 4**), ERI had the most explanatory power (56.5% of the variance explained) over depressive symptoms when examined in a joint model with job strain and organizational injustice. In addition, job strain made a notable, although statistically non-significant, contribution to depressive symptoms (33.5% of the variance explained), whereas the contribution of organizational injustice was only marginal (10% of the variance explained). The observed relative importance of ERI over job strain and organizational injustice was unaffected by adjustment for age and gender (data not shown).

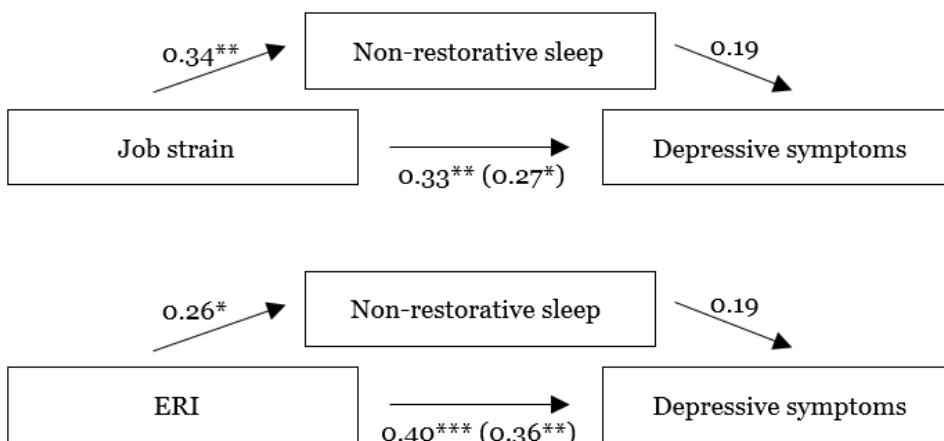


Figure 2. Indirect associations of job strain and ERI with depressive symptoms through non-restorative sleep (standardized regression coefficients, adjusted for age and gender). The coefficients in parenthesis represent the direct effect of the predictor when controlling for the mediator. $N = 69-73$.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

As a supplementary analysis, the relative importance of job strain, ERI, and organizational injustice in predicting sleep problems was assessed. Whereas job strain was the most important predictor of both sleep onset problems (76.4% of the variance explained) and non-restorative sleep (66.6% of the variance explained), ERI predicted the majority of variance explained in sleep maintenance problems (47.6%). However, the three characteristics of the psychosocial work environment explained only a fraction of the total variance in sleep onset and sleep maintenance problems (3% to 5.5%). A more meaningful amount of variance was explained in non-restorative sleep (15.4%) (see **Table 4**). The results remained essentially unchanged after adjusting for age and gender (data not shown).

Table 4. Relative weight analysis of job strain, ERI, and organizational injustice predicting depressive symptoms and sleep problems.

Predictor	Depressive symptoms	Sleep problems ^a		
		Sleep onset problems	Sleep maintenance problems	Non-restorative sleep
Job strain	33.5%	76.4%	40.8%	66.6%*
ERI	56.5%**	20.9%	47.6%	29.7%
Organizational injustice	10%	2.7%	11.6%	3.6%
Total weight	100%	100%	100%	100%
Total variance explained (R^2)	23.5%	3.0%	5.5%	15.4%

Note. $N = 72-74$. Relative weights are presented as a percentage of R^2 , e.g. the proportion of total variance explained. ^aSupplementary analysis.

* $p < 0.05$; ** $p < 0.01$.

4.2 EFFORT-REWARD IMBALANCE, BURNOUT, AND RECOVERY (STUDY II)

Study II examined the association of ERI with burnout, as well as the mediating role of recovery (in terms of recovery experiences and sleep problems) in this association. ERI was associated with both higher total burnout score ($\beta = 0.46, p < 0.001$) and all three dimensions of burnout, that is, exhaustion, cynicism, and reduced professional efficacy (β s ranging from 0.33 to 0.44, p -values < 0.01). In addition, ERI predicted lower levels of relaxation and control over leisure time ($\beta = -0.30, p = 0.011$ and $\beta = -0.27, p = 0.023$, respectively) and higher levels of non-restorative sleep ($\beta = 0.30, p = 0.008$).

According to bootstrap mediation analyses conducted separately for each recovery experience and sleep problem variable, non-restorative sleep explained 19% of the association between ERI and total burnout score ($\beta_{\text{indirect}} = 0.09$, 95% CI 0.008 to 0.237) and 34% of the association between ERI and exhaustion ($\beta_{\text{indirect}} = 0.11$, 95% CI 0.031 to 0.251). In addition, low levels of relaxation explained 16% of the association between ERI and reduced professional efficacy ($\beta_{\text{indirect}} = 0.06$, 95% CI 0.002 to 0.184). **Figure 3** describes the indirect associations.

As a supplementary analysis, the associations between recovery experiences and sleep problems using relative weight analysis were examined (**Table 5**). Together, recovery experiences explained the highest amount of variance in non-restorative sleep (29.9%). Poor detachment contributed the most to sleep onset and sleep maintenance problems (62.2% to 65.2% of the variance explained), while poor control over leisure time was the most important predictor of non-restorative sleep (38.6% of the variance explained). Adjusting for age and gender did not essentially change the results (data not shown).

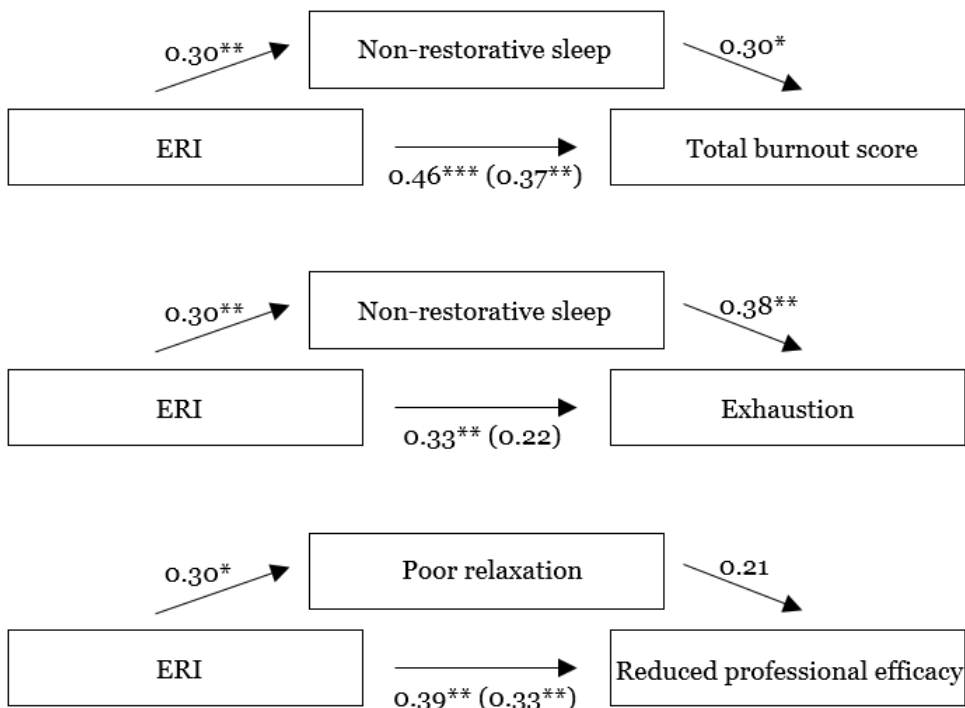


Figure 3. Indirect associations of ERI with burnout through non-restorative sleep and poor relaxation (standardized regression coefficients, adjusted for age, gender, and total working hours). The coefficients in parenthesis represent the direct effect of the predictor when controlling for the mediator. $N = 72$.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 5. Relative weight analysis of recovery experiences predicting sleep problems.

Predictor	Sleep onset problems	Sleep maintenance problems	Non-restorative sleep
Detachment	62.2%**	65.2%	28.4%
Relaxation	11.9%	26.2%	30.1%
Mastery	1.6%	2.1%	2.9%
Control	24.3%	6.5%	38.6%*
Total weight	100%	100%	100%
Total variance explained (R^2)	15.6%	8.2%	29.9%

Note. $N = 76$. Relative weights are presented as a percentage of R^2 , e.g. the proportion of total variance explained. Supplementary analysis.

* $p < 0.05$; ** $p < 0.01$.

4.3 WORKPLACE VIOLENCE, SLEEP PROBLEMS, AND ORGANIZATIONAL JUSTICE (STUDY III)

Study III examined the association between workplace violence and disturbed sleep and the moderating role of organizational justice. Because violence was operationalized in a broad sense and included both verbal and physical threats, the overall prevalence of exposure to violence was relatively high: For any form of violence, 33% in 2014. More than half of the exposed teachers had experienced multiple forms of violence: 70% had experienced threatening behavior, 72% had experienced verbal threats, and 31% had experienced physical acts of violence.

First, the effect of encountering violence on sleep was examined. Among teachers reporting exposure to violence, there was a small increase in disturbed sleep at the time of the violent event compared to the level of sleep disturbances two years earlier (RR 1.32, 95% CI 1.15 to 1.52). The increase in disturbed sleep persisted for two years after the event (RR 1.26, 95% CI 1.07 to 1.48). There was no similar increase in disturbed sleep among teachers with no exposure to violence (RR 1.10, 95% CI 0.96 to 1.27 and RR 1.13, 95% 0.95 to 1.35 for the randomly assigned time point and the subsequent wave, respectively).

Examination of the effects of organizational justice showed that teachers working in low justice conditions experienced more frequent sleep disturbances than those in high justice conditions. Furthermore, the effect of violence on sleep was dependent on the level of justice (**Figure 4**). In high justice conditions, there was no increase in sleep disturbances at the time of the violent event. In contrast, the increase was apparent among teachers who experienced intermediate or low levels of justice: 1.59-fold (95% CI 1.04 to 2.42) among those with intermediate procedural justice and 1.46-

fold (95% CI 1.01 to 2.09) among those with low interactional justice (**Table 6**). These increases in sleep disturbances did not persist after the violent event.

A sensitivity analysis including only participants who had information on sleep from at least the wave preceding exposure to violence and the wave of exposure was performed to assess the robustness of the findings. The analysis replicated the findings of the main analyses in terms of an increase in sleep disturbances in association with a violent event (RR 1.27, 95% CI 1.08 to 1.49). The associations between exposure to violence and disturbed sleep across different levels of justice were also similar to those detected in the main analysis (see **Table 6**). In this smaller sample, the interaction terms for justice were, however, non-significant.

Finally, as a supplementary analysis, gender interactions were tested. The effect of encountering violence on sleep was not conditional on gender (for time \times gender interaction, p -values from .466 to .970) and the moderating role of organizational justice was similar for both men and women (for time \times justice \times gender interaction, p -values from .397 to .935).

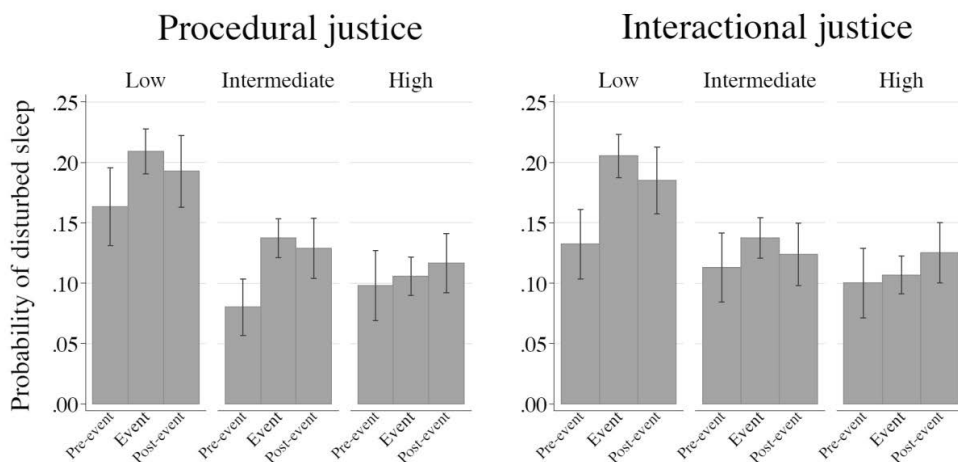


Figure 4. Predicted probabilities of disturbed sleep among teachers reporting exposure to a violent event in low, intermediate, and high justice conditions. Predictions were derived from log-binomial regression analysis using generalized estimating equations, adjusted for age and gender. $N = 4\ 988$.

Table 6. Risk of disturbed sleep in association with a violent event and different levels of organizational justice.

Variable	Main analysis				Sensitivity analysis			
	Procedural justice		Interactional justice		Procedural justice		Interactional justice	
	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)	RR	(95% CI)
Time								
Pre-event	1		1		1		1	
Event	1.08	(0.80 to 1.47)	1.07	(0.80 to 1.43)	1.03	(0.71 to 1.51)	1.11	(0.80 to 1.52)
Post-event	1.19	(0.84 to 1.68)	1.25	(0.90 to 1.74)	0.86	(0.53 to 1.40)	1.21	(0.81 to 1.80)
Organizational justice								
High	1		1		1		1	
Intermediate	0.82	(0.54 to 1.24)	1.13	(0.77 to 1.66)	0.72	(0.44 to 1.19)	1.03	(0.67 to 1.58)
Low	1.67**	(1.17 to 2.37)	1.32	(0.92 to 1.90)	1.87**	(1.26 to 2.76)	1.25	(0.84 to 1.87)
Event × intermediate justice	1.59*	(1.04 to 2.42)	1.14	(0.77 to 1.68)	1.35	(0.79 to 2.32)	1.02	(0.65 to 1.59)
Event × low justice	1.19	(0.83 to 1.70)	1.46*	(1.01 to 2.09)	1.29	(0.84 to 1.97)	1.34	(0.90 to 2.00)
Post-event × intermediate justice	1.35	(0.84 to 2.18)	0.88	(0.56 to 1.37)	1.87	(0.92 to 3.78)	0.82	(0.47 to 1.47)
Post-event × low justice	0.99	(0.66 to 1.49)	1.12	(0.74 to 1.69)	1.40	(0.81 to 2.44)	1.14	(0.69 to 1.90)

Note. N = 4 988 (main analysis) and N = 1 056 (sensitivity analysis). RR = risk ratio; CI = confidence interval. Adjusted for age and gender. The estimates are from final models including the main effect of time and justice, and all time × justice interactions.

* $p < 0.05$; ** $p < 0.01$.

5 DISCUSSION

This thesis examined psychosocial work characteristics in association with health-related outcomes among Finnish primary and secondary school teachers. To facilitate the development of effective, evidence-based ways of preventing illness and promoting health among teachers, the thesis also investigated the mediators and moderators of the association between psychosocial work characteristics and teacher health.

5.1 STRESSFUL PSYCHOSOCIAL WORK ENVIRONMENT IN TEACHING

One of the key findings of the study was that psychosocial work characteristics in terms of ERI and, to some extent, with respect to job strain, are relevant predictors of adverse health-related outcomes among Finnish primary school teachers. The results highlight the usefulness of the ERI model in explaining poor teacher health: Not only was ERI associated with higher levels of burnout, it was also the strongest predictor of depressive symptoms when compared with other characteristics of the psychosocial work environment. The observed significance of the ERI model in explaining poor health supports previous findings from the Chinese studies (Loerbroks et al., 2014; Wang et al., 2014), and improves understanding of the relatively weaker role of job strain and organizational injustice as predictors of health problems among teachers. It is well known that the teaching profession entails a considerable amount of social interaction with students and their parents. The ERI model may, therefore, be particularly successful in explaining the harmful effects of a stressful psychosocial work environment in teaching, because it takes into account some of the social aspects of the work environment, such as the respect and support the employee receives. This resonates with recent findings that lack of respect and support are risk factors for declining mental health among teachers (McLean, Abry, Taylor, Jimenez, & Granger, 2017).

Although job strain also had associations with adverse health-related outcomes, some of these associations were no longer significant when the effects of ERI were controlled for. This implies that although job strain can be used as an indicator of a stressful psychosocial work environment in teaching, research applying the ERI model probably obtains more accurate predictions. Based on the findings of the current study, the job strain model appears, nevertheless, rather suitable for predicting impaired sleep among Finnish teachers.

Contrary to previous findings from the public sector, organizational injustice was not a particularly important predictor of poor health in teaching. With regard to sleep problems, the effects of poor justice were inconsistent across Studies I and III: Whereas Study I found no association, Study III demonstrated a significant association between low justice and sleep problems. Overall, these results might be explained by some of the distinguishing characteristics of the teaching profession.

Organizational justice (or lack of justice) might not play a particularly central role in the development of health problems in teaching because the profession entails independent decision-making and professional freedom, the number of working hours is regulated, and the pay is collectively negotiated – at least this is the case in Finland. However, it is also possible that, because of the small sample size, Study I lacked statistical power to detect the effects of injustice.

In this study, the majority of teachers reported experiencing a high ERI (effort-reward ratio > 1), and experiences of job strain or organizational injustice were much less uncommon. This supports previous studies that report high prevalence estimates (up to 67%) particularly of ERI among teachers (Hinz et al., 2016; Loerbroks et al., 2014; von Känel, Bellingrath, & Kudielka, 2009). Besides being an important predictor of adverse health-related outcomes, ERI thus appears to be a typical characteristic of Finnish teachers' psychosocial work environment – and consequently, a potential target for occupational stress interventions.

5.2 INDIRECT PATHWAYS THROUGH RECOVERY

The effects of a stressful psychosocial work environment on teacher health were partially mediated through some aspects of recovery. Specifically, non-restorative sleep partially explained the association of job strain with depressive symptoms, as well as the association of ERI with depressive symptoms and burnout. In comparison to ERI, the indirect effect through non-restorative sleep was greater in the relationship between job strain and depressive symptoms. This probably reflects the differences in the constructs of the two work stress models and the overall stronger association between job strain and impaired sleep.

In addition to the indirect pathways through non-restorative sleep, the association between ERI and burnout (namely, the dimension of reduced professional efficacy) was partially mediated through low relaxation during leisure time. It is noteworthy that the observed importance of relaxation in teaching is in contrast to the view of detachment as the core recovery experience linking occupational stress to impaired health (Sonnentag & Fritz, 2015; Sonnentag et al., 2010). In addition, poor control over leisure time emerged as a significant predictor of non-restorative sleep, suggesting that being able to decide when and how to pursue non-work activities can influence sleep quality.

Several processes may explain the observed indirect pathways through recovery. Working in a stressful psychosocial environment can cause negative affect which may, in turn, impact the choice of leisure time activities and lead to a sedentary lifestyle (Kouvonen et al., 2006). A stressful psychosocial work environment can also cause physiological stress reactions, such as attenuated heart rate variability during the most restorative first hours of sleep, reflecting possible prolonged sympathetic drive in the autonomic nervous system (Lindholm et al., 2012). According to the findings, lack of recovery-promoting leisure time activities could also have a negative impact on sleep, suggesting that the various aspects of recovery are probably intertwined. Lastly, it is

also possible that the observed associations reflected reverse or bidirectional relationships (discussed under Methodological considerations, p. 38).

Returning to COR theory, insufficient recovery from exposure to a stressful psychosocial work environment can leave teachers' resources drained and, consequently may contribute to poor health. Overall, these findings further support the view of recovery as a mediator in the association between psychosocial work characteristics and health-related outcomes. While the strongest indirect effect was observed in the association between ERI and exhaustion through non-restorative sleep, the indirect effects were in general relatively weak. This suggests that although recovery might be a mediator of the effects of a stressful psychosocial work environment, it certainly does not play a major role in transmitting these effects on health in teaching.

5.3 WORKPLACE VIOLENCE AND SLEEP PROBLEMS

Exposure to workplace violence was associated with a small increase in sleep disturbances among teachers. This is the first evidence from a longitudinal design to support previous findings on the association between workplace violence and sleep problems (Hanson, Perrin, Moss, Laharnar, & Glass, 2015; LeBlanc & Kelloway, 2002). Encountering violence at work seemed to affect teachers' sleep not only at the time of the violent event, but also two years after the event. It is, however, possible that higher levels of disturbed sleep after the violent event reflected, to some extent, repeated exposure to violence.

Violent encounters at work have previously been associated with anger, anxiety, and poor mental health, as well as with symptoms of post-traumatic stress disorder (Hogh & Viitasara, 2005; Lanctôt & Guay, 2014). The results could, therefore, be explained by a heightened state of physiological and psychological alertness, resulting in disruptions in teachers' sleep. Fear of future violence may also explain both the acute and the possible sustained effects of violence (LeBlanc & Kelloway, 2002).

5.4 WORKPLACE VIOLENCE AND THE MODERATING ROLE OF JUSTICE

The effect of violence on sleep was most pronounced among teachers working in relatively unjust conditions, while the sleep of those perceiving high organizational justice was not affected by violence. The results are in line with previous findings that suggest that high organizational justice may protect from health problems caused by stressful life events outside work (Elovainio, Kivimaki, et al., 2010). Importantly, the results also support the recent cross-sectional finding that implies that teachers' satisfaction with how violent acts are handled at school can mitigate their harmful effects (Fox & Stallworth, 2010). This study further contributes to the previous literature by demonstrating the protective effects of justice against the negative influence of workplace violence in a large-scale prospective design.

It is worth noting that, in Study III, compared to high justice conditions, teachers who experienced low procedural justice had rather frequent sleep disturbances. This strong main effect of low procedural justice on disturbed sleep at baseline could explain why exposure to violence had no further substantial effect on sleep in low procedural justice conditions. Overall, with regard to the protective effect of high organizational justice, the results were more coherent for interactional than procedural justice.

The observed moderating role of justice in the association between exposure to violence and sleep can be explained by, for example, trust (or mistrust) towards management. Fair organizations and supervisors are probably more reactive to workplace violence and promote a work environment in which violent acts are taken seriously. If teachers feel they can trust their supervisor and that all issues related to violence are handled appropriately, exposure to violence might not have a major impact on health. However, working in unjust conditions can contribute not only to lack of trust in supervisors (Colquitt & Rodell, 2011), but also to occupational stress (Elovainio, Kivimäki, & Helkama, 2001) and difficulties enduring uncertainty (van den Bos & Lind, 2002), which may all aggravate the negative health consequences of workplace violence.

5.5 METHODOLOGICAL CONSIDERATIONS

The study has several methodological strengths. Firstly, it used well-validated measures of stressful psychosocial work environment, sleep, and health-related outcomes. From a statistical point of view, a second methodological strength was the use of bootstrap analysis for testing the mediated indirect effects and the use of relative weight analysis in examining the proportionate contributions of multiple correlated predictor variables. A third strength was that, with repeated measures of sleep, generalized estimating equations were used to take into account the within-person correlation between sleep measurements. The sleep measurements were nested within participants, and the non-independence of the within-person observations was taken into account when estimating the standard errors.

The study also has limitations that should be considered. Most importantly, Studies I and II were cross-sectional, thus no claims about causality can be made, and possible reverse causality cannot be ruled out. Although previous research has reported temporal associations between psychosocial work characteristics, sleep, and poor health (Baglioni et al., 2011; Nieuwenhuijsen et al., 2010; Van Laethem et al., 2013), there is also evidence of a reciprocal relationship between them (Armon, Shirom, Shapira, & Melamed, 2008; Hanson et al., 2011; Lang, Bliese, Lang, & Adler, 2011). It is, therefore, possible that the results reflect bidirectional associations, in which poor health causes poor recovery or experiences of stressful psychosocial work environment, and vice versa.

Studies I and II had a relatively small sample size and may thus have lacked statistical power to detect significant associations. Furthermore, there were only a few participants from each school, increasing the risk of non-response bias. Response rates alone are not, however, the best indicators of bias due to non-response (Wagner,

2012). Despite the response rate being low in these studies, the age and gender distributions of the teachers were fairly comparable to the national age and gender distributions among teachers in Finland. Furthermore, the levels of organizational justice and job strain in the sample were also comparable to previous studies using similar measures (Perko & Kinnunen, 2013; Yang et al., 2012). The level of ERI seemed, however, to be higher than that in some previous studies examining occupational stress in teaching, indicating that teachers experiencing high ERI may be overrepresented in the sample. In conclusion, the results of Studies I and II may to some, but probably not a major, extent also have been influenced by non-response. The generalizability of the results is limited to similar populations.

In Studies I and II, sleep onset problems and non-restorative sleep were ordinal variables, and the results of the mediation analyses should, therefore, be interpreted with caution. However, continuous methodology with ordinal variables can produce acceptable results when the number of categories is five or higher, as was the case in these studies (Johnson & Creech, 1983). It should also be noted that Study II had some overlap in one of the items measuring exhaustion and the item measuring non-restorative sleep. The item for non-restorative sleep, however, focuses more on sleep, whereas the item for exhaustion focuses on job-related tiredness in the morning.

In Study III, the number of missing sleep measures was relatively high, particularly before the wave of exposure to violence. This could partially reflect non-response but, probably to a larger extent, the characteristics of the Finnish Public Sector study and the design of the current study. New participants are regularly recruited, as others retire or leave the public sector. Especially in the waves preceding the violent event, missing values in sleep could reflect changes in the study population. Furthermore, because sleep was measured for the first time concurrently with the first possible wave of the violent event, participants reporting violence in this particular wave did not have prior measures of sleep.

On a final note, the data were gathered solely through self-report questionnaires. Collecting physiological measures of stress and sleep would have strengthened the study and eliminated the possibility of spurious inflation due to common method variance, such as potential bias due to self-reports. However, the common method variance problem in studies using self-reports may to be overstated (Spector, 2006), and rather than inflating associations, common method variance has sometimes shown an attenuating effect (Conway & Lance, 2010).

5.6 CONCLUSIONS AND PRACTICAL IMPLICATIONS

The results of the present thesis add to the previous literature on psychosocial work characteristics and health-related outcomes in teaching. First, the thesis provides insights into the stressful characteristics of Finnish teachers' psychosocial work environment, highlighting the importance of achieving a balance between effort and reward at work. Secondly, it complements prior research on teachers by exploring the mediating role of recovery in the association between psychosocial work characteristics and health-related outcomes. Finally, the thesis provides new evidence

on the favorable effect of high organizational justice for teachers experiencing violence at work.

Adjusting the demanding aspects of the teachers' psychosocial work environment and increasing rewarding elements, such as the respect and support a teacher receives, could be important for preventing occupational stress among Finnish primary school teachers. Improving the quality of social interaction with colleagues, students' parents, and supervisors should thus be considered in the promotion of teacher health. It is, however, noteworthy, that student behavior and misconduct are also important factors that influence teachers' perceptions of the support and respect they receive. The modern student-centered school culture in Finland emphasizes equality and positive, understanding attitudes towards students, even towards those who exhibit behavioral problems. The school culture, therefore, imposes emotional labor by requiring teachers to suppress their negative emotions in their encounters with unruly students (Anttila & Väänänen, 2015). This kind of emotional labor could be particularly stressful in situations in which students' disruptive behavior progresses into threatening or violent demeanor.

Although preventive measures for teacher-targeted violence should be prioritized, resources aimed at promoting organizational justice in schools could mitigate the adverse consequences of teacher victimization. Because violence towards teachers is typically clustered in certain schools (Ervasti, Kivimäki, Pentti, et al., 2012), endorsing fairness is especially important in educational organizations characterized by high levels of aggression. Organizational justice can be improved by, for example, providing teachers with opportunities to participate in decision-making processes, listening to their concerns, and encouraging open dialogue with the management. Supervisors can be trained to interact with empathy and consideration and to handle violent situations in a way that makes teachers feel that their concerns are taken seriously and addressed appropriately. Overall, although low organizational justice might not be a significant risk factor for occupational stress in teaching, high justice can represent a valuable resource in the teachers' work environment.

Whereas improving the characteristics of teachers' psychosocial work environment is the first and probably the most important step in supporting teacher health, interventions that focus on increasing teachers' ability to unwind after working hours and reducing sleep problems could further complement workplace development programs. Finding ways to relax during non-work hours is important, particularly for teachers experiencing occupational stress. Detaching mentally from work during leisure time can prevent difficulties falling asleep, and a variety of leisure time recovery activities can promote refreshing, good quality sleep. Together these preventive measures could most efficiently help teachers maintain good health.

Because recovery during leisure time does not, however, seem to play a major role in mediating the effects of a stressful psychosocial work environment on health in teaching, future studies could explore other factors that potentially explain the association, such as work-family conflict. Work-family conflict might be especially relevant in the teaching profession (Grund, Brassler, & Fries, 2016), because teachers' working hours are distributed throughout the day, and include out-of-classroom hours. Furthermore, recent evidence suggests that work-family conflict predicts sleep problems among women, but not men (Johannessen & Sterud, 2017). Considering the

fact that teaching is a highly female-dominated profession, studies examining characteristics of the psychosocial work environment, work-family conflict, and health are warranted.

In order to gain a better understanding of how psychosocial work characteristics affect teacher health, future studies should also explore the role of personality and other individual dispositions. For example, it remains to be examined whether the high level of sickness presenteeism among teachers is associated with a lack of resources in education or with dispositions such as overcommitment. In terms of adverse health consequences, being overcommitted may be even more dangerous for teachers than experiencing effort-reward imbalance at work (von Känel et al., 2009).

Finally, as teachers and students share the same psychosocial environment (Elovainio et al., 2011; Virtanen et al., 2009), more research is needed on the associations between teachers' and students' health, their joint psychosocial climate, and teacher-targeted violence. It is possible that sickness presenteeism among teachers, for example, has harmful effects on the overall psychosocial climate of the classroom, which, in turn, may influence students' health and behavior. Longitudinal studies including information on students and classroom-level characteristics could further enhance our understanding of how the psychosocial environment, workplace violence against teachers, and health are associated in the teaching profession.

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