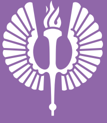

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RISK OF MENTAL DISORDERS AMONG SOCIAL WORKERS

Comparative study between professions in Nordic countries

Otso Rantonen

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ABSTRACT

Social work is a highly demanding human service profession, which has also been identified in studies for decades. For example, multiple studies have reported a high risk of burnout and turnover in social work. Also, studies have identified that human service professionals, and health and social care professionals in particular have a higher risk of common mental disorders (CMD) than employees in other professions. Despite this, there are few register-based studies on the risk of in social work, and it is therefore not clear whether social workers are at increased risk compared to other professions. Furthermore, it is not clear which work-related factors may increase the risk of mental disorders.

This study aimed at analysing the risk of common mental disorders (CMD) among social workers compared with other human service and non-human service professionals. Additionally, the aim was to investigate whether job stress mediates the excess risk of CMD among social workers. In Study I, social workers were compared with preschool teachers, special education teachers and psychologists for the risk of sickness absence or disability pension (work disability) due to CMD in Finland and Sweden. Also the probability of returning to work (RTW) after work disability was investigated in these comparisons. In Study II, the probability of both incident and long-term antidepressant treatment among social workers was analysed by comparing the probability of antidepressant treatment among social workers with probability among employees in health and social care, education and non-human service professions in Finland, Sweden and Denmark. Analyses were done separately in each cohort, and in addition a meta-analysis was performed with all cohorts included. Study III combined register data on work disability with questionnaire data collected as part of the Finnish Public Sector Study, the largest follow-up study of public sector employees in Finland. The risk of work disability due to CMD was analysed among social workers compared with health and social care, education and non-human service professions. In comparisons where social workers had a higher risk of disability due to CMD, we examined whether the risk was associated with a higher job strain or effort-rewards imbalance (ERI) in social work. Counterfactual mediation analysis was used to examine the mediating effect of job stress.

In Study I, social workers in Finland and Sweden had a higher risk of work disability due to mental diagnoses compared with preschool teachers and special

education teachers. In Sweden, but not in Finland, social workers also had a higher risk than psychologists. Also, in Sweden in the final model, special education teachers had a 9% higher probability of RTW from work disability spells than social workers. No other differences in RTW were observed. In Study II, the pooled effects for any and long-term treatment showed that probabilities were 10% higher among social workers compared with other health and social care professionals and 30% higher compared with education and non-human service professionals. Probabilities for any treatment in the three countries were relatively similar. For long-term treatment, however, the probability among social workers in Finland was greater than in Sweden and Denmark, in the comparisons with health- and social care and education professionals. In Study III, social workers had about a 2-fold higher risk for future work disability due to CMD compared with education professionals, 1.5-fold higher risk compared with non-human service professionals, but no excess risk compared with other health and social care professionals. Social workers' job stress was at higher level only when compared with education professionals. The 2-fold risk compared with education professionals was partly mediated by job strain (24%) and ERI (12%).

In conclusion, health and social care professionals and social workers in particular have an elevated risk of CMD. This was evident from the analyses of work disability due to CMD and use of antidepressant medication in Nordic countries. Second, balancing the two prevalent job stressors, the combinations of high psychological job demands and low control and high efforts and low rewards, in social work could reduce the risk of work disability due to CMD to some extent, but also other risk factors should be considered. The importance of identifying these factors in future studies and in workplaces can be seen as a central implication from this dissertation. This is important in order to succeed in early prevention of mental disorders caused by psychosocial risk factors by improving the working conditions in social work.

KEYWORDS: Social work, Human service profession, Common mental disorder, Sickness absence, Antidepressant treatment

TURUN YLIOPISTO
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TIIVISTELMÄ

Sosiaalityö on erittäin vaativa ihmissuhdeammatti, mikä on todettu myös tutkimuksissa jo vuosikymmenien ajan. Esimerkiksi useissa tutkimuksissa on raportoitu, että sosiaalityössä on suuri riski työuupumukseen ja vaihtuvuuteen. Lisäksi tutkimuksissa on todettu, että ihmissuhdeammateissa työskentelevillä ja erityisesti sosiaali- ja terveysalan ammattilaisilla on suurempi riski sairastua masennus- ja ahdistuneisuushäiriöihin kuin muiden ammattien työntekijöillä. Tästä huolimatta rekisteripohjaisia tutkimuksia masennus- ja ahdistuneisuushäiriöiden riskistä sosiaalityössä on vähän, ja siksi ei ole selvää, onko sosiaalityöntekijöillä kohonnut riski verrattuna muihin ammatteihin. Lisäksi ei ole selvää mitkä työhön liittyvät tekijät voivat lisätä riskiä mielenterveyden häiriöille.

Tämän tutkimuksen tavoitteena oli analysoida sosiaalityöntekijöiden riskiä sairastua masennus- tai ahdistuneisuushäiriöihin verrattuna muissa ihmissuhdeammateissa työskenteleviin työntekijöihin. Lisäksi tavoitteena oli selvittää, johtuuko kohonnut riski masennus- tai ahdistuneisuushäiriöille suuremmasta työstressin määrästä sosiaalityössä. Tutkimuksessa I sosiaalityöntekijöitä verrattiin varhaiskasvatuksen opettajiin, erityisopettajiin ja psykologeihin tutkimalla masennus- ja ahdistuneisuushäiriöistä johtuvien sairauspoissaolojen tai työkyvyttömyyseläkkeiden (työkyvyttömyys) riskiä Suomessa ja Ruotsissa. Lisäksi tutkittiin työhön paluun todennäköisyyttä työkyvyttömyysjaksojen jälkeen näissä vertailuissa. Tutkimuksessa II analysoitiin todennäköisyyttä masennuslääkehoidon aloittamiselle sekä pitkäaikaiselle masennuslääkkeiden käytölle sosiaalityössä Suomessa, Ruotsissa ja Tanskassa, vertaamalla sosiaalityöntekijöitä sosiaali- ja terveydenhuollon ja opetusalan työntekijöihin sekä toimistotyöntekijöihin, jotka eivät työskennelleet ihmissuhdeammateissa. Analyysit tehtiin erikseen kunkin kohortin osalta ja lisäksi tehtiin meta-analyysi, jossa kaikki kohortit otettiin mukaan. Tutkimuksessa III yhdistettiin sairauspoissaolojen ja työkyvyttömyyseläkkeiden rekisteridata kyselylomakeaineistoon, joka oli kerätty osana suomen suurinta julkisen sektorin työntekijöiden seurantatutkimusta, Kunta10-tutkimusta. Masennus- tai ahdistuneisuushäiriöistä johtuvan työkyvyttömyyden riskiä analysoitiin vertaamalla riskiä sosiaalityössä verrattuna sosiaali- ja terveydenhuollon ja opetusalan työntekijöihin sekä toimistotyöntekijöihin, jotka eivät työskennelleet ihmissuhdeammateissa. Niissä vertailuissa, joissa sosiaalityöntekijöillä oli korkeampi masennus- tai ahdistuneisuushäiriöistä

johtuvan työkyvyttömyyden riski, tutkittiin selittääkö työn psyykkinen kuormittavuus (job strain) tai ponnisteluiden ja palkkioiden epäsuhta (effort-reward imbalance) suurempaa riskiä sosiaalityössä. Työstressin väittävää vaikutusta tutkittiin kontrafaktuaalisen mediaatioanalyysin avulla.

Tutkimuksessa I sosiaalityöntekijöillä Suomessa ja Ruotsissa oli korkeampi riski olla pois töistä mielenterveyden häiriöistä johtuvan työkyvyttömyyden vuoksi verrattuna varhaiskasvatuksen opettajiin ja erityisopettajiin. Ruotsissa, mutta ei Suomessa, sosiaalityöntekijöillä oli suurempi riski myös verrattuna psykologeihin. Ruotsissa lopullisessa mallissa erityisopettajilla oli lisäksi 9 prosenttia suurempi todennäköisyys palata töihin työkyvyttömyysjakson jälkeen verrattuna sosiaalityöntekijöihin. Muita eroja työeläkkeelle siirtymisessä ei havaittu. Tutkimuksen II meta-analyysin perusteella masennuslääkehoidon aloittaminen ja pitkäaikaisen masennuslääkehoidon todennäköisyys oli 10 prosenttia korkeampi sosiaalityössä verrattuna todennäköisyyteen sosiaali- ja terveydenhuollon ammattilaisilla ja 30 prosenttia korkeampi verrattuna todennäköisyyteen sekä opetusalan ammattilaisilla että toimistotyöntekijöillä. Masennuslääkkeiden käytön aloittamisen riskitasot sosiaalityössä olivat kaikissa vertailuissa kolmessa maassa suhteellisen samanlaisia. Masennuslääkkeiden pitkäaikaisen käytön osalta sosiaalityöntekijöiden riski oli kuitenkin suurempi Suomessa kuin Ruotsissa ja Tankassa, kun sosiaalityöntekijöitä verrattiin sosiaali- ja terveydenhuollon ja opetusalan ammattilaisiin. Tutkimuksessa III sosiaalityöntekijöillä oli noin 2-kertainen riski masennus- tai ahdistuneisuushäiriöistä johtuvalle työkyvyttömyydelle verrattuna opetusalan ammattilaisiin, 1,5-kertainen riski verrattuna toimistotyöntekijöihin, jotka eivät tehneet ihmissuhdetyötä, mutta riski ei ollut suurempi verrattuna muihin sosiaali- ja terveydenhuollon ammattilaisiin. Sosiaalityöntekijöiden työstressi oli korkeammalla tasolla vain verrattuna opetusalan ammattilaisiin. Suurempi masennus- tai ahdistuneisuushäiriöistä johtuva työkyvyttömyyden riski sosiaalityössä johtui osittain työn psyykkisestä kuormittavuudesta (24 %) ja työn ponnisteluiden ja palkkioiden epäsuhdasta (12 %).

Yhteenvetona voidaan todeta, että sosiaali- terveydenhuollon ammattilaisilla ja erityisesti sosiaalityöntekijöillä on kohonnut masennus- ja ahdistuneisuushäiriöiden riski. Tämä kävi ilmi sosiaalityöntekijöiden työkyvyttömyyden ja masennuslääkkeiden käytön analyyseissa Pohjoismaissa. Toiseksi, kahden yleisen työstressitekijän, korkeiden työn vaatimusten ja matalien vaikutusmahdollisuuksien yhdistelmä sekä työn ponnisteluiden palkkioiden epäsuhdan, tasapainottaminen voisi vähentää masennus- ja ahdistuneisuushäiriöistä johtuvien sairauspoissaolojen ja työkyvyttömyyseläkkeiden riskiä, mutta myös muut riskitekijät on otettava huomioon. Näiden riskitekijöiden tunnistamisen merkitystä tulevissa tutkimuksissa ja työpaikoilla voidaan pitää tämän väitöskirjan keskeisenä johtopäätöksenä. Tämä on tärkeää, jotta psykososiaalisista riskitekijöistä aiheutuvien mielenterveyden häiriöiden varhainen ennaltaehkäisy onnistuu sosiaalialan työoloja parantamalla.

ASIASANAT: Sosiaalityö, Ihmissuhdeammatti, Mielialahäiriöt, ahdistuneisuushäiriöt, Sairauspoissaolot, Masennuslääkkeet.

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First, I would like to thank my supervisor, Paula Salo for tricking me to start my Master's thesis in her guidance as part of the Finnish Public Sector Study. Her ingenious strategy was to underline in her call for potential supervisees that the student should be motivated to pursue the use of advanced statistical techniques in a challenging but rewarding project. Naturally, this peaked my interest. The Master's thesis was not only a success, but as a part of it we also ended up designing and initiating a two-phase questionnaire study in 2013 and 2015 for social workers as part of the Finnish Public Sector Study. Unfortunately we ended up not using these data in this dissertation due to various factors. However, the ambition in this project was so captivating that I decided to advance to doctoral studies and begin working on this dissertation. Thank you Paula for encouraging me to start this project. To this day, I sometimes still wonder how you did it, but nevertheless, I am ever thankful for that and for believing in me along the way!

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In 2016–2018 I worked at the Department of Psychology and Language-Pathology at the University of Turku. The whole staff at the department supported me along the way. In particular, everyone who attended the department's legendary floor-hockey group kept me going. From that time I also want to thank my roommate Suvi for all the discussions that we had. Later on I have had many colleagues who have also supported me along the way. Thank you to all for the support and discussions. I also want to thank all my friends who have supported me, in particular Saana, Mikko M., Martti, Antti, Tapio, Henri, Aaro and Mikko K..

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May 2025

Otso Rantonen

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List of Original Publications

This dissertation is based on the following original publications, which are referred to in the text by their Roman numerals:

I Rantonen, O., Alexanderson, K., Pentti, J., Kjeldgård, L., Hämäläinen, J., Mittendorfer-Rutz, E., Kivimäki, M., Vahtera, J., & Salo, P. Trends in work disability with mental diagnoses among social workers in Finland and Sweden in 2005–2012. *Epidemiology and Psychiatric Sciences*, 2017; 26 (6): 644-654. https://doi.org/10.1017/S2045796016000597

II Rantonen, O., Alexanderson, K., Clark, A.C., Aalto, V., Sónden, A., Brønnum-Hansen, H., Hougaardd, C.Ø., Rod, N. H., Mittendorfer-Rutz, E., Kivimäki, M., Oksanen, T., & Salo, P. Antidepressant treatment among social workers, human service professionals, and non-human service professionals: A multi-cohort study in Finland, Sweden and Denmark. *Journal of Affective Disorders*, 2019; 250(9): 153–162. https://doi.org/10.1016/j.jad.2019.03.037

III Rantonen, O., Ervasti J., Alexanderson, K., Mittendorfer-Rutz, E., Oksanen, T., Aalto, V. & Salo, P. Does job stress mediate the risk of work disability due to common mental disorders among social workers compared with other health and social care, education, and non-human service professionals? A prospective cohort study of public sector employees in Finland *Scandinavian Journal of Work, Environment & Health,* 2024; 50(6):456-465. https://doi.org/10.5271/sjweh.4171.

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1 Introduction

Work and mental health are closely connected, which is evident in the definition of mental health by the World Health Organization (WHO): “mental health is state of mental well-being that enables people to cope with the stresses of life, to realize their abilities, to learn well and work well, and to contribute to their communities” (World Health Organization, 2022). Also, a strong mental work capacity has become as important as ever in the modern working life, and life in general, due to the social acceleration of life (e.g. new technologies, cognitive demands, and increased pace of life) (Hsu & Elliott, 2015; Ulferts et al., 2013). WHO states that optimally meaningful work has the potential to improve mental health by contributing to a person’s sense of accomplishment, confidence, economic safety and inclusion (World Health Organization, 2022). However, in social work and many other human service professions employees are more likely to develop a mental disorder, despite the work being meaningful, and sometimes perhaps for that very reason. In social work, for example, the job usually has high stakes and employees are invested in helping their clients. However, employees face an ever higher workload, time pressure and productivity demands with insufficient resources – a combination that is likely to lead to ethical dilemmas in client work and mental health problems (Blomberg, 2019; Blomberg et al., 2015; Mänttäri-van der Kuip, 2016; Morinière, 2023; Tham, 2018).

Indeed, the challenges of life and working life are highlighted by a high rate of mental disorders in the working-aged population in general. About 15% of work-aged individuals experience mental disorders during the lifetime, most often due to mood or anxiety disorders, which are jointly called common mental disorders (CMD) (World Health Organization, 2022). This leads to an estimated cost of over US$ 1 trillion each year for the global economy, due to sickness absence, disability pension and lost productivity (Cuijpers et al., 2016). In 2023, an estimated 26 000 work days were lost in man-years among Finnish employees as a result of sickness absences due to mental disorders, which accounts to costs of over billion euros annually (Social Insurance Institution, 2024b). Disability pensions due to mental disorders have also increased since 2016 and they are now the most common cause for disability pensions (Finnish Centre For Pensions, 2020). The increased rates of

sickness absence and disability pension and the fact that sickness absence spells due to mental disorders are often long, equates to high costs for the society and employers. Also, CMD lead to individual suffering, and decreased productivity and capability to cope with stressors among those who continue to work while experiencing mental health symptoms (presenteeism) (Ferrari et al., 2022; Greenberg et al., 2021; World Health Organization, 2017). Thus it is as important as ever to study which occupations within the working population in particular are at risk, and how work-related factors are associated with the risk of CMD in these occupations.

For decades studies have reported that social work is a highly demanding profession, and the risk of burnout and turnover is high (Aronsson et al., 2014; Coyle, 2005; DePanfilis & Zlotnik, 2008; Frieiro Padín et al., 2021; Lloyd et al., 2002; Mcfadden, 2015; Mor Barak et al., 2001; Ravalier, 2019; Ravalier et al., 2020; Söderfeldt et al., 1995; Tham, 2007; Webb & Carpenter, 2012). Since the early 2000s, psychosocial conditions in social work have deteriorated (e.g. higher job demands, increased role conflicts and less possibility to influence important decisions), turnover has increased and the job content has shifted from meaningful facilitative client work to conducting investigations that require high amount of administrative tasks (Tham, 2018). Also, the role of social work has changed with changes in the welfare state and the social context of social work. Descriptions from the social work trade journal *Talentia*, named according to the Union for social care professionals, indicate that since the 1970s, such changes have increased emotional job requirements in social work, likely through increasing conflicting demands a higher need for services from clients (Turtiainen et al., 2022). Further, in recent years an age of economic austerity and global crises have impacted both clients and the resources in social work (Mänttäri-van der Kuip, 2014, 2016). Consequently, social workers in Finland report that economic pressures have increased and the opportunity for ethically responsible social work has decreased due to a lack of resources in a rigorous economic context (Mänttäri-van der Kuip, 2014, 2016). These challenges have been identified in other countries as well, but they may be even more pronounced than in Finland, where 61% of Finnish social workers report high workload and 54% report major role conflicts in their work (Blomberg et al., 2015).

The challenges of social work have been identified in the public view as well, in particular through media narratives about the crisis of social services (Blomberg, 2019). Scandals in child welfare services and tragic cases of deaths are often highlighted in the media as mistakes, blaming individual staff members by some parties, while other parties blame the failed system (Blomberg, 2019). *Talentia* has highlighted that about half of the social workers report that they have to work against their professional values, experience burnout or are considering changing the

profession as a whole due to factors such as time constraints, high client workload and poor leadership (Talentia, 2022). The employee shortage and the consequent problems in client safety has affected child welfare social work in particular and thus the Finnish Government has made a change in legislation in child welfare to increase the availability of new employees by decreasing the eligibility requirements for social workers employed in temporary positions for a year (Talentia, 2024). This was however criticized by *Talentia* beforehand in a petition that was sent to the government, because the legislation could decrease client work quality and increase problems in well-being among employees (Ministry of Social Affairs and Health, 2024a). This illustrates the conflicting demands and lack of organizational resources in social work, as well as the divide between the condition of the welfare state and the values of employees and social work in general.

Studies have identified that human service professionals, and health and social care professionals in particular have a higher risk of mental disorders than employees in other professions (Björkenstam et al., 2021; Buscariolli et al., 2018; Kokkinen et al., 2014; Kokkinen et al., 2019; Lidwall et al., 2018; Madsen et al., 2010; Madsen et al., 2012, 2022; Milner et al., 2019a; Samuelsson et al., 2013; Wieclaw et al., 2006). A few relatively recent studies have highlighted social workers as the most significant risk group for the risk of mental disorders, in particular among male employees (Buscariolli et al., 2018; Kokkinen et al., 2019). Also, studies based on self-report measures have shown a higher rate of burnout and more adverse psychosocial conditions in social work than many other professions (Borritz et al., 2006; Tham & Meagher, 2009). Thus, it is likely that the risk of CMD could be higher in social work as well, compared with non-human service professions and potentially other human service professions. However, register-based studies about the risk of CMD and risk factors for CMD in social work are lacking, and they are needed to provide valid and robust estimates of the state of mental health in social work (Allebeck, 2009; Thielen et al., 2009). Identification of the risk of CMD and associated risk factors in social work is important, because it can guide organizations in reducing planning interventions that reduce the imbalance of job demands and resources, or preventive strategies that counter the high risk of CMD and support return to work (RTW).

In general working population, adverse psychosocial working conditions with register-based outcomes of CMD, such as sickness absence due to common mental disorders (CMD) (Duchaine et al., 2020; Madsen et al., 2017; Theorell, 2015; Van Der Molen et al., 2020), antidepressant treatment (Milner et al., 2019b) and in- or outpatient treatment for depression (Madsen, 2017). In particular, two models of job stress have been the prominent in studies about psychosocial risk factors among employees: the job Demand-Control (JD-C) (Karasek, 1979) and effort-reward imbalance models (ERI) (Siegrist, 1996). Both of have been associated with the risk

of CMD in multiple studies (Duchaine et al., 2020; Madsen, 2017; Theorell, 2015; Van Der Molen et al., 2020). Thus, job strain and ERI could increase the risk of CMD among social worker as well. Also, some studies suggest that psychological job demands, such as workload, work pace and ERI are high in social work (Aronsson et al., 2014; Blomberg et al., 2015; Mcfadden, 2015; Ravalier et al., 2020; Rugulies et al., 2009; Tham & Meagher, 2009).

Despite studies indicating potentially high job strain and ERI in social work, few studies have investigated whether they are major risk factors in social work, and whether they are valid indicators of job stress in social work. For example, job control may be relatively high in social work due to autonomy in decision making. This would decrease job strain based on the model, but in social work high autonomy and the responsibility that comes with it conversely be a stressor (Tham & Meagher, 2009). Similarly, although one study showed that ERI is high in social work (Rugulies et al., 2009), it is not clear whether it is a good indicator of job stress in social work. Some studies suggest that in some human service professions qualitative demands (e.g. emotional demands in client work) are more pronounced than quantitative demands, and thus the latter may not be associated with poor mental health as strongly (van Vegchel et al., 2004).

I aimed to fill these gaps in research by investigating the risk of CMD among social workers in particular and whether job strain (high job demands and low control) or ERI mediate the risk of CMD among social workers compared with other professions. In the first two studies of this dissertation, the risk of any mental disorders was investigated using register data from national registers on work disability (Study I), and the risk of mental disorders requiring antidepressant treatment (Study II). In Study I, social workers in Finland and Sweden in 2005–2012 were included, and work disability due to mental disorders and returning to work after work disability were analysed among social workers compared with three human service professions. In Study II, social workers in Finland, Sweden and Denmark in 2006–2014 were included, and antidepressant treatment among social workers, health and social care professionals, education professionals and non-human service professionals was analysed. In Study III, we investigated whether social workers' risk of work disability due to CMD was higher than that of other social and healthcare professionals, education professionals, and non-human service workers and whether job strain and ERI mediated those associations. We applied the counterfactual framework, which to our knowledge, studies have not utilized previously to investigate mediators for CMD in human service professions.

2 Review of the literature

2.1 Human service professions

2.1.1 Description of human service professions

Human service professions consist of professions, where the core activity is client work and contact with other people, with a purpose to support their well-being (Hasenfeld, 1992; Hochschild, 2012). For example, in health and social care professions (e.g. medical doctors, nurses, home-care professionals, psychologists and social workers) this includes treating patients and interacting with clients with a goal to improve well-being. In education professions (e.g. preschool teachers and primary education teachers), primary job characteristics include teaching, supervising a classroom of students and providing a supportive teaching environment. In social work, in general the core activities include supporting individuals or families in challenging life situations and coordinating a plan that includes services and support systems, with the goal to prevent social exclusion and promote inclusion in the society (Ministry of Social Affairs and Health, 2024c). Naturally, job characteristics differ from sector to sector, but client work and the emotional labour that comes with it connects social work and other human service professions (Hasenfeld, 1992; Hochschild, 2012). Indeed, emotional labour and high emotional demands also differentiate human service professionals from non-human service professionals (Framke et al., 2019; Goldberg & Goodyer, 2014; James Diefendorff et al., 2013; Moesby-Jensen & Nielsen, 2015; van Vegchel et al., 2004; Zapf, 2002).

Hasenfeld (1992) describes that human service organizations differ from other types of organizations in several ways. First, the employees work with individuals and thus all activity must be ethically justified. Second, goals are often vague, ambiguous and complex. For example, social work is grounded in both legislations (Ministry of Social Affairs and Health, 2024b, 2024c) and an empathetic goal of helping the client, which can be in conflict. Also helping the client according to legislations may be hard due to economic constraints and low organizational resources. Third, it is usually unclear how human service professions are able to obtain the goals that they strive towards. For example, in social services clients' life

situations are complex and it is not always straightforward or fully known how the situation can be solved, in contrast to a straightforward treatment of a simple disease with a known cure, for example.

Fourth, the core activity in these organizations is client work and the quality of client work is influenced not only by the organization, but also factors that are less controllable. In social work these can include the personal attributes of the client and their family, other situational factors, dynamics of the relationship and how it develops and societal conditions. Fifth, the employees in human service professions often hold high autonomy and discretion. For example, in social work the assigned case worker holds most of the responsibility over the decisions and the process. Thus social workers and other human service professionals have been referred to as "street-level bureaucrats" (Lipsky M., 2010). Sixth, human service organizations often lack measures to assess whether they have succeeded, which is also associated with the ambiguity of goals and difficulties in evaluating service outcomes when working with individuals and many uncontrollable factors. In social work, for example client's problems are often difficult and the nature of client relationships may make it less likely for employees to witness success in their work. Instead an inability to work according to own values is common in social work (Mänttäri-van der Kuip, 2014, 2016), which may be a primary assessment of success, or lack thereof, among social workers.

Human service professionals also differ from each other according to job characteristics and the types of organizations they are employed in. Human service organizations can be divided into three types of organizations: people processing, people sustaining and people changing organizations (Hasenfeld, 1992). Each of these can be further categorized depending on the type of clients the employees face: that is either normally functioning or malfunctioning (Hasenfeld, 1992). For example, teachers work in people changing organizations with predominately normally functioning students, whereas social workers work in people changing organizations with predominately malfunctioning clients. This has consequences of the types of aims that these organizations have and the type of stressors that the employees face. For example, working with malfunctioning clients likely increases the amount of emotional demands and emotional labour in social work.

Human service professionals have been a focus of burnout research for multiple decades (Maslach et al., 2001). Register-based studies have used occupational classification systems to identify individuals employed in human service professions. For example, in the studies included in this dissertation the Classification of Occupations for the cohorts in Finland was used (Statistics Finland, 2001). When comparing studies among human service professions, it is of note that countries often have different classification systems for occupations, which means that the same category (e.g. human service professions) can include different

professions (Milner et al., 2019a). Human service professions have been defined either at the subgroup level (e.g. home care professionals, preschool teachers) or at a more general level. The most common definition for human service professions is either differentiating between human service and non-human service professions (e.g. Aronsson et al., 2019), or differentiating between health and social care, and education professionals, which are the two main human service sectors (e.g. Björkenstam et al., 2021; Kokkinen et al., 2014). A few relatively recent studies had more elaborate categorizations into health professionals, education professionals, social workers, customer services and miscellaneous, and in these studies occupations were also investigated at the subgroup level (including police officers and psychologists) (Buscariolli et al., 2018; Kokkinen et al., 2019).

In this dissertation, health and social care, education and non-human service professionals were included in addition to social workers as a separate group, in Studies II and III. In study I psychologists, preschool teachers and special education teachers were included, in addition to social workers. The professions included in these groups based on ISCO codes are shown in Table 1.

Health and social care professions employed 14.6% of all employees in Finland in 2019 (N = 407 427), which makes it the biggest occupational sector in Finland (Ministry of Economic Affairs and Employment, 2022). Health and social care professions are a major employee group also in the public sector. In 2023, there were 213,000 health and social care employees in the public sector, about 60% of who were employed in health care professions and 40% in social care professions (Finnish Institute of Health and Welfare, 2023). The major occupational groups in this sector were associate/practical nurses (19%), nurses (17%), social care associate professionals (10%) and home-care employees (9%), and about 3% were social workers (Ministry of Economic Affairs and Employment, 2022; Finnish Institute of Health and Welfare, 2023). In 2023, about 4,700 social workers were employed in the public sector (Finnish Institute of Health and Welfare, 2023). Education professionals are also a significant employee group in the public sector. In 2021, about 8% of the working population were employed in the education sector in Finland (Education Statistics Finland, 2021).

In the past few decades more and more studies have accumulated evidence about the risk of mental disorders in these professions (Björkenstam et al., 2021; Buscariolli et al., 2018; Kokkinen et al., 2014; Kokkinen et al., 2019; Lidwall et al., 2018; Madsen et al., 2010; Madsen et al., 2012, 2022; Milner et al., 2019a; Samuelsson et al., 2013; Wieclaw et al., 2006). In particular, employment in health and social care professions has been associated with an elevated risk of mental disorders in these studies. However, only few studies have investigated specific risk professions in more detail with register data (Buscariolli et al., 2018; Kokkinen et al., 2019).

A few such studies were conducted relatively recently. One study among Finnish employees showed that social workers had the highest risk of sickness absence due to mental disorders, when compared with all other professions, followed by health professions (Kokkinen et al., 2019). In addition, social workers had the highest risk among all human service professions, when compared with all other professions with a similar skill level (excluding other human service professions), among male employees, and among female employees home care assistants had the highest risk, followed closely by social workers. All in all, male human service professionals showed higher risks than female employees in sex-specific comparisons. Another study showed similar results for the risk of antidepressant treatment with relatively similar comparison groups and analysis strategy (Buscariolli et al., 2018).

Table 1. Occupational sectors, occupations and ISCO-88 codes.

SECTOR	OCCUPATION	ISCO-88 CODE
	Social workers	2446
Other health & social care professionals	Medical doctors	2221
	Psychologists	2445
	Physiotherapists	3226
	Nursing and midwifery professionals and associate professionals	223, 323 51321, 51322, 51324
	Social work associate professionals	3460
	Home-based Personal care workers	5133
Education professionals	Secondary education teaching professionals	231, 232
	Primary Education Teaching professionals	2331
	Pre-primary education teaching professionals	2332
	Special education teaching professionals	2340
Non-human service professionals	Administrative and executive secretaries, and General, keyboard and customer clerks	41, 42

These recent studies suggest that social workers may be one of the most significant risk group for mental disorders, in particular among male employees. However, more studies are needed to clarify whether social workers are a major risk group among human service professionals, and few studies have investigated social workers specifically. Thus studies that focus on the risk of mental disorders among

social workers are needed. In addition, more studies that investigate human service professions at the sub-group level are needed, as only a few have done this (Buscariolli et al., 2018; Lidwall et al., 2018; Kokkinen et al. 2019; Wieclaw et al., 2006). Comparative studies among human service professions have also suggested that social work may be more challenging than most other human service professions, which could increase the risk of CMD as well (e.g. Tham & Meagher, 2009). However, to my knowledge studies have not compared the risk of CMD between social workers and other professions in particular, by using register data. Further, it is not clear which factors may increase the risk among social workers.

We focused on social workers specifically in this dissertation. Also, in Study III we investigated whether job stress is higher in social work than other human service professions, which has also been indicated by previous studies (Aronsson et al., 2014; Borritz et al., 2006; Madsen et al., 2010; Rugulies et al., 2009; Tham & Meagher, 2009). In Study I we included three human service professions as reference professions at the subgroup level (psychologists, preschool teachers and special education teachers) and in Studies II and III we compared social workers with two major human service profession sectors (health and social care and education professions) and non-human service professions (i.e. office workers), which in contrast do not include features of client work. Health and social care, education and non-human service professions have been utilized as reference professions in some previous studies, too (e.g. Björkenstam et al., 2021; Kokkinen et al., 2014), and thus they were logical comparison groups in this dissertation as well.

2.1.2 Social workers

The International Federation of Social Workers defines social work as a profession that has a unique societal role in promoting social change, which differentiates it from most other human service professions (International Federation of Social Workers, 2014). This global definition of social work states that "social work is a practice-based profession and an academic discipline that promotes social change and development, social cohesion, and the empowerment and liberation of people. Principles of social justice, human rights, collective responsibility and respect for diversities are central to social work. Underpinned by theories of social work, social sciences, humanities and indigenous knowledge, social work engages people and structures to address life challenges and enhance wellbeing."

The societal role of social workers has also been described with the concept of a street-level bureaucrat, which means that social workers utilize power through decisions that impact their clients' lives (Lipsky M., 2010; Warner, 2021). Social workers have a dual role of both being a helper and a controller: the controlling role in social work is about addressing client's deviant life situations or behaviour by

applying legislations and building action plans to facilitate change in the situation, whereas the supporting role is about supporting the client in building towards changes in their lives through counselling and supportive discussions (Blomberg et al., 2015; Lloyd et al., 2002). Social workers have high responsibility over such decisions and they impact the clients' lives greatly, which can be both rewarding and stressful. Often clients' life situations are complicated due to multiple problems that may be transgenerational and chronic in nature, which increases the complexity of decision-making. Thus, providing adequate help to clients may also be difficult. In particular, in child welfare professions these job demands are high (Tham & Meagher, 2009).

In Finland, The Ministry of Social Affairs and Health is responsible for the social policy and prepares legislation on social welfare (Ministry of Social Affairs and Health, 2024c). Provisions on social welfare and social services are laid down in the Social Welfare Act (Social Welfare Act 1301/2014) and special acts on social welfare (e.g. Child Welfare Act 417/2007), which are outlined elsewhere in detail (Ministry of Social Affairs and Health, 2024b). These legislations are the basis of all client work and decision-making and they clarify the core activities in social work. Social work requires an understanding of the laws and applying these legislations to the clients' life situations correctly.

The Social Welfare Act (Social Welfare Act 1301/2014) states that the aim in social work is to plan a set of services that meet the clients' or client families' needs. This should include social support as means for facilitating change and working not only with the individuals, but also their families and communities. In practice, this means collaboration and coordination with other organizations and professionals to implement a common plan that is monitored carefully. Also, social work principles include strengthening the individual's or families' own operating capabilities and social participation and sense of belonging, and promote the social integrity of communities (Social Welfare Act 1301/2014).

The laws not only define the role of social workers but also the mission of the wellbeing service counties. In Finland the wellbeing service counties must organise social services to "support people in coping with everyday life, provide housing-related support, give financial support, prevent social exclusion and promote inclusion, respond to the need for support caused by domestic and intimate partner violence or other forms of violence and abuse, respond to the need for support in acute crises, safeguard the balanced development and well-being of children, respond to the need for support caused by alcohol or drug abuse, mental health issues or other illness or disability or ageing respond to other need for support relating to physical, psychological, social or cognitive functional capacity, and support family and friends of those in need of support." (Ministry of Social Affairs and Health, 2024c). The client's needs for services are evaluated by social workers with an

assessment that must be started at once and completed without delay, and urgent services must be organized immediately (Ministry of Social Affairs and Health, 2024c). Finnish citizens have the right for this assessment and a social welfare client is entitled to have their own worker that know the case. However, many well-being service counties have struggled to meet these standards of the legislations (Regional State Administrative Agency, 2024).

These aspects highlight how the responsibility and complexity of decision-making and tight deadlines are major job stressors in social work. Client work thus requires time and adequate employee resources. However, studies show that these requirements are often not met in social work, which causes ethical dilemmas and moral distress among social workers (Mänttäri-van der Kuip, 2014, 2016). This state of social services violates client rights principles, which are embedded in the theories, values and ethics of social work (Staub-Bernasconi, 2016). These principles are also evident in the global ethical principles of social work, laid out by the International Federation of Social workers (International Federation of Social Workers, 2018). All in all, the challenges of social services impact both employee well-being and the quality and safety of client work.

The provision of social services in Finland is based on the model of the Nordic welfare state, which are integrated in the national legislations that define social work (Kröger, 2011). In theory, the model is characterized by generous and universal welfare benefits, coverage of social service beyond class boundaries and welfare arrangements that should cover the entire population, and an emphasis on social services instead of benefits (Kröger, 2011). Social services promote the values and goals of the welfare state model by conducting social work in practice (Blomberg et al., 2010). On the other hand, the challenges in the social service sector and inadequate resources raise questions whether the Finnish welfare state is still a realized in practice (Möttönen & Kettunen, 2014; Talentia, 2021, 2024). For example, an important function in the model is preventive social work that aims at normalising life situations of clients with serious social problems. This is an important function of child welfare, which however may not be realized in practice (Blomberg et al., 2010).

Social workers are employed in diverse fields that have different job characteristics and clientele (Table 2.). At a general level, fields of social work can be divided, according to a lifecycle model into 1) services for families with children, 2) services and support for adults with disabilities, and 3) services and benefits for old people (Ministry of Social Affairs and Health, 2024c). Other specific responsibilities and areas of social work in Finland are described in the Social Welfare Act (Social Welfare Act 1301/2014) and other special legislations for social services (Ministry of Social Affairs and Health, 2024b). One sector that has been a focus of research in particular, is the child welfare sector, which has been identified

as a significant risk sector for burnout and high turnover (Baldschun et al., 2019; DePanfilis & Zlotnik, 2008; Kim & Kao, 2014; Mcfadden, 2015; Mor Barak et al., 2001; Sage et al., 2018; Sprang et al., 2011; Tham, 2007, 2018; Tham & Meagher, 2009; Travis et al., 2016).

Table 2. A general description of social work sectors and job characteristics.

Social work sector	Job characteristics
Services for families with children	Home services for families with children, family work, and child guidance and family counselling.
Services and support for adults with disabilities	The support needs of people with disabilities are primarily met by general health and social services, and if their help is not adequate, the right to special services is determined.
Services and benefits for old people	Home care, informal care support, services supporting mobility and various housing services.

2.2 Common mental disorders

2.2.1 Diagnostic criteria of common mental disorders

Mood and anxiety disorders are the two most prevalent mental disorders and they are communally referred to as CMD (Stansfeld et al., 2016; World Health Organization, 2017). They are characterized by negative impacts of the mood or feelings of the individual, with symptoms ranging from mild to moderate and severe, and duration ranging from months to years (World Health Organization, 2017). In the working population, CMD are a source of great individual suffering and economic costs due to sickness absences, treatment costs, and decreased productivity due to a reduced capability to cope with stressors among those who continue to work despite being ill (presenteeism) (Ferrari et al., 2022; Greenberg et al., 2021; Nicholson, 2018; World Health Organization, 2017). Eventually CMD can lead to sickness absence, disability pension, antidepressant treatment or other forms of treatment. In the studies included in this dissertation we measured CMD differently in each study: in Study I, the outcome was work disability (sickness absence or disability pension) due to any mental disorders (and CMD in sensitivity analyses), in Study II antidepressant treatment (any or long-term treatment as a proxy for depression requiring treatment), and in Study III work disability due to CMD. These measures will be described in more detail later in this chapter.

CMD are a multidimensional phenomenon that can result from a combination of biological, psychological and social factors (Goldberg & Goodyer, 2014; Kendler et al., 2002, 2006). For example, risk factors for depression include characteristics of

cognitions and cognitive processes (e.g. cognitive biases, depressed information processing), acute or prolonged stressful situations, sociodemographic factors (e.g. female gender), parental depression, and various traits, behaviour patterns, and dispositions (Hammen, 2018). Also, social factors such as social isolation (Bruce & Hoff, 1994), negative life events and childhood adversity (Fryers & Brugha, 2013), and economic factors, such as debt and financial strain (Meltzer et al., 2013) are associated with CMD. Comprehensive descriptions about the wide range of risk and protective factors for CMD is outside the scope of this dissertation, but studies have identified multiple factors that have been reported elsewhere (Brook & Schmidt, 2008; Hammen, 2018; Moreno-Peral et al., 2014; Struijs et al., 2021; Zimmermann et al., 2020). In this dissertation I focused on psychosocial risk factors for CMD (Duchaine et al., 2020; Madsen et al., 2017; Theorell, 2015; Van Der Molen et al., 2020), and more specifically job strain (Karasek, 1979) and ERI (Siegrist, 1996). These will be described in more detail in Chapter 2.3.

There are two main international classifications of diseases that specify symptoms and diagnostic criteria for disorders, the International Classification of Diseases (ICD-10) and the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) (American Psychiatric Association, 2013; World Health Organization, 2019). In this dissertation the diagnoses were based on the ICD-10 (World Health Organization, 2019). CMD diagnoses include different types of mood and anxiety disorders that on the other hand can present some similar and overlapping symptoms (Mathew et al., 2011; Wittchen et al., 2003). In addition, mood and anxiety disorders are often comorbid (i.e. appear in the same person at the same time or after one another) (Mathew et al., 2011; Wittchen et al., 2003). In Study I, I included all mental disorders when analysing the risk of work disability (ICD-10 codes F00–F99; and in sensitivity analyses F32–34, F41, F43), where as in Study III, I included only CMD diagnoses (ICD-10 codes F30–F39 for mood disorders and F40–F48 for anxiety disorders). In Study II, no diagnosis data was used for the outcome, and instead antidepressant was used to indicate mood disorders requiring antidepressant treatment. The diagnostic criteria for these diagnoses can be found in the ICD-10 classification (World Health Organization, 2019).

CMD can cause serious deterioration in work capacity and well-being in general (Nicholson, 2018; Plaisier et al., 2010; Stansfeld et al., 2016; World Health Organization, 2017). Often mood disorders result in more significant burden on work functioning than anxiety disorders (Plaisier et al., 2010; World Health Organization, 2017). Depression is the most common mental disorders diagnosis (Moffitt et al., 2010; Nicholson, 2018; Stansfeld et al., 2016; World Health Organization, 2017). Among employees, about 80% of employees with major depressive disorder report difficulty with work and other daily activities as a result of depression (Greenberg et al., 2021).

ICD-10 defines a depressive episode (F32) through the following main symptoms: depressed mood, decrease in activity, loss of interest and enjoyment, reduced energy leading to an increased fatigability and diminished activity, disturbed sleep, reduced self-esteem and self-confidence, ideas of guilt and unworthiness, lack of appetite and various somatic symptoms (e.g. lack of interest and pleasurable feelings). In serious cases, these symptoms and a pessimistic view of the future can lead to ideas of acts of self-harm or suicide (World Health Organization, 2019). Several sub-categories for depressive disorders have been defined. For example, repeated episodes of depression may be defined as recurrent depression (F33). Persistent and usually fluctuating disorders of mood that can't don't meet the criteria of other depressive diagnoses may be defined as persistent mood disorders. Other diagnoses among mood disorders (F30–F39), that were included in Study I for example, also include bipolar affective disorders (F31), and manic episodes (F30), to name a few.

Common symptoms in any anxiety disorder include anxiety, worry, panic attacks and avoidance (Stansfeld et al., 2016). Anxiety disorders (Neurotic, stress-related and somatoform disorders in ICD-10) include different types of disorders with varying characteristics, such as generalized anxiety disorder (F41.1), panic disorder (F41.0), various phobic anxiety disorders (F40), obsessive-compulsive disorder (F42), reaction to severe stress, and adjustment disorders (F43) and somatoform disorders (F45) (World Health Organization, 2019).

2.2.2 Quality and benefits of using register-based data to study common mental disorders

Mental disorder diagnoses are based on a clinical interview and questionnaires administered and assessed by a medical professional**.** Among the working-aged population, a diagnosis leads to a treatment plan, which can include sickness absence, disability pension or medication treatment, for example, among other treatment options. Data about such register-based indicators of CMD are available in Nordic countries through national health registers, which provide a good opportunity for register-based research on mental health with reliable data that bypasses research biases typically related to self-report data (Wettermark et al., 2013). In the Nordic countries the completeness and accuracy of the register data is high in general (Furu et al., 2010; Gissler & Haukka, 2004).

Using register data for research on mental disorders has several strengths over self-report data. In general, these include cost-effectiveness of data collection, large number of subjects, good representativeness, low attrition, high validity, no selective drop-out, high coverage of the study population and a long follow-up (Gissler & Haukka, 2004). Also, the possibility for record linkage often enables including other

variables that may be potential confounders (Allebeck, 2009). In this dissertation register-based data on work disability (sickness absence or disability pensions) and antidepressant treatment were used. Their specific strengths and limitations are discussed in detail later in this section. In short, the strengths above are true in particular for work disability data, but for antidepressant data some limitations are more prevalent. For example, antidepressant data only includes data on prescriptions and they do not indicate when or if the individual took the medication, which decreases the specificity of the measure (Furu et al., 2010).

Still most studies have utilized self-report measures to assess mental health symptoms, although self-report data has multiple limitations. First is the validity of the results. That is, the assessment is not done by a medical professional and thus the symptoms do not indicate a mental disorder diagnosis. With register data the mental disorder cases are based on real diagnoses made by a certified medical professional (i.e. medical doctor or psychiatrist). In contrast, even a high score on a self-report measures does not necessarily indicate a clinically significant mental disorder (Boyd et al., 1982). For example, the sensitivity and specificity of several self-report measures of mental health problems have been proven weak to predict service use among a sample of Finnish working-aged individuals (Elovanio et al., 2020).

Other limitations of self-report data include the common method, recall, social desirability and selection biases (Bromet et al., 1986; Thielen et al., 2009; Tourangeau & Yan, 2007). Further, a lack of statistical power and misclassification are common challenges in studies based on self-report (Thielen et al., 2009). In Study III, we used questionnaire data on job stress from the Finnish Public Sector Study (Kivimäki et al., 2004), which has a large sample size, and thus these challenges were mitigated. A particular difference between register-based data and self-report data is that attrition due to mental disorders is a major problem in questionnaire-based studies and thus register-based studies are important for accumulating reliable findings about the predictors of mental disorders (Goldberg et al., 2006). This limitation is naturally present when combining register data with questionnaire data, as was done in Study III.

A few prerequisites are needed for high quality register data on mental disorders. First, individuals should have equal access to treatment with adequately low cost, because the availability of mental health services impact the population coverage of the data (Thielen et al., 2009). In Finland, individuals in general have a good opportunity to access health care services, but social inequality may still impact the measure. It is often assumed that in terms of sensitivity and specificity, misclassification of the outcome does not differ between the exposure groups (Thielen et al., 2009). However, misclassification of individuals may be differential, which is a central concern with register data on mental disorders. In the case of differential misclassification, the sensitivity or specificity of the measure varies

between exposure levels, which can lead to biased results (Thielen et al., 2009). Some individuals may be more likely to be treated due to determinants, such as age, gender and educational level, whereas others may be left untreated (Thielen et al., 2009). For example, studies suggest that gender differences in depression may be greatly overestimated, and social inequality in depression may be underestimated (Thielen et al., 2009).

Two other important characteristics are high sensitivity of the measure (i.e. whether all individuals with a diagnosis are identified or included) and high specificity (i.e. whether those that are identified or included have the medical condition). For example, antidepressants are sometimes administered for other conditions than depression as well, which decreases it's specificity, but it is nonetheless a well-suited indicator commonly used in studies (Thielen et al., 2009). Also, the register data on prescriptions only shows who were prescribed the medication and not how many actually took antidepressants and thus initiated and continue treatment. Register data on mental disorders is based on a diagnosis, which is thus the basis of such data. I will next work disability and antidepressant treatment as measures of CMD in more detail, as well as the strengths and limitations of using these data.

2.2.3 Work disability due to mental disorders

Sickness absence or disability pension always includes a diagnosis, but these are not always specified in studies at all, or multiple diagnoses are summed together. In Studies I and III, we utilized data on sickness absence and disability pension due to any mental disorders (ICD-10 diagnoses F00–F99), and in Study III, we investigated common mental disorders (ICD-10 diagnoses F30–F39 or F40–F48). Mental disorders are the most common diagnoses for sickness absence and disability pension in Finland (Social Insurance Institution, 2023). Data on sickness absence is gathered by the Social Insurance Institution of Finland and data on disability by the Finnish Centre for Pensions. According to these data, the amount of new sickness absence spells has increased in general population since the mid-1990s and in 2004-2011, which was the study period in this dissertation, and to about 30% in 2022 (Finnish Institute Of Occupational Health, 2024). In 2004−2011 about 16−17% of all sickness absence spells were due to mental disorders (Finnish Institute Of Occupational Health, 2024).

In general there has been a further increasing trend of sickness absence due to CMD, since the end of follow-up of the studies in this dissertation (Finnish Institute Of Occupational Health, 2024). The growth has been strongest in anxiety disorders diagnoses, in particular among employees aged 25−34 years (Social Insurance Institution, 2024a). Still, depression diagnoses are the most common diagnosis for

sickness absence with mental diagnoses (Social Insurance Institution, 2024a). In 2023, about 100 000 individuals received sick leave due to CMD, which accounts to about 3% of the working-aged population (Social Insurance Institution, 2024a). An estimated 26 000 work days were lost in man-years as a result of sickness absences due to mental disorders, which accounts to costs of over billion euros annually (Social Insurance Institution, 2024b). These figures have increased in the past decade.

Disability pensions due to mental disorders have also increased during the past few decades, in particular since 2016 (Finnish Centre For Pensions, 2020; Finnish Institute Of Occupational Health, 2024). Currently, over half of the individuals on disability pension have a mental disorder diagnosis and they constitute the primary reason for permanent work disability in Finland (Finnish Centre For Pensions, 2024; Finnish Institute Of Occupational Health, 2024). The average age of a disability pension retiree with any diagnosis was 52 years and there was only a minor gender difference, based on estimates from 2019 (Finnish Centre For Pensions, 2020). However, two-in-three disability pension diagnoses due to depression diagnoses were given to women and their mean age was only 47 years. This is related to the increase of disability pensions due depression diagnosis among women under 35 years, which has been a worrisome trend in recent years (Finnish Centre For Pensions, 2020). These high rates and the fact that sickness absence spells due to mental disorders are often long, equates to high costs for the society and employers.

There are some important characteristics to consider when using data on sickness absence or disability pension as outcome. First, although doctor’s diagnosis has greater validity than self-report measures, it is not certain that the diagnosis is always accurate (Hensing & Wahlström, 2004). For example, a person with depression may have an anxiety disorder diagnosis, because the two are highly comorbid disorders (Mathew et al., 2011; Wittchen et al., 2003). Similarly, obstructive sleep apnea and depression present similar symptoms and are often comorbid (Cass et al., 2024; Edwards et al., 2020; Finnish Centre For Pensions, 2024). Specifically, the information that the individual presents, impacts the diagnosis. The greater the stigma associated with the diagnosis, the less probability there is that the patient either seeks help or frames the problem that way, which is evident in the rarity of alcohol- or drug-related diagnoses, for example (Hensing & Wahlström, 2004). During the past few decades, the stigma associated with mental disorders has decreased, which has been suggested as one explanation for the increase in sickness absence due to mental disorders (Social Insurance Institution, 2024a).

Second and partly relating to the previous, the coverage of sickness absences as a measure of ill-health at work is not 100%, because some employees fail to seek medical consultation despite mental health symptoms. Thus, sickness absence as a measure may underestimate the degree of morbidity and impaired work capacity

due to mental health problems (Hensing & Wahlström, 2004). This is also related to the concept of presenteeism (being sick at work). In addition to those employees who are absent from work due to a sickness, many employees still experience mental health symptoms and a reduction in work capacity, even though they continue working. CMD are associated with a reduction in social, cognitive and emotional functions, and stress tolerance that are required for good work capacity in human service professions and most other professions (Hensing & Wahlström, 2004). Sickness absence does not cover the loss in productivity and suffering among those employees. Studies suggest that the costs of presenteeism in depression are 5–10 times higher than the costs of absenteeism (Evans-Lacko & Knapp, 2016).

Third, sickness absence spells in mental disorders are often long, which may be related to the slow recovery, recurrence of these disorders, and lack of treatment and rehabilitation options (Hensing & Wahlström, 2004). Eventually long-term sickness absence can lead to disability pension (Kivimäki et al., 2004). A recent study shows that among individuals who had applied for disability pension due to mental disorders, only a minority had received effective treatment for depression in the form of psychotherapy and antidepressants (Kujanpää et al., 2023). Less than 20% had received psychotherapy and less than 40% had received some form of rehabilitation, 5 years before application. About half had reimbursed purchases of two or more antidepressants during the past year before the application. These aspects illustrate how sickness absences due to mental disorders are a source of high costs, and how the spells last long due to the slow recovery from disorders and insufficient treatment. This also increases the risk of permanent disability pension among due to mental disorders (Kivimäki et al., 2004; Social Insurance Institution, 2024b).

Countries have different legislations when it comes to sickness absence and disability pension and they change over time. The studies in this dissertation included the years 2004–2011. In Finland during those years, the employee had to present to the employer a physician's certificate usually from the 4th day onwards after being absent from work. Sickness benefit was paid after 10 days of sickness for a maximum of 300 working days during two consecutive years. After that, the employee could apply for temporary or permanent disability pension. In Study I, we also included data on sickness absence and disability pension from Sweden. In Sweden, the employee had to present a physician's certificate from the day 8 of sickness. Up to 2008, there was no maximum time limit for sick leave, but the duration of sickness absence has since been set at 364 days in the period of 15 months. In cases of serious disease, extended sickness benefit can be granted additionally 550 days (altogether 914 days).

2.2.4 Antidepressant treatment

Antidepressants are a recommended fist-line treatment for moderate to severe major depressive disorder (Cleare et al., 2015). In addition, short-term mild major depression (i.e. few symptoms beyond the minimum and mild functional impairment) can be treated with antidepressants and they should be considered if the patient has prior history of moderate to severe depression or if the symptoms have lasted for more than 2–3 months (Cleare et al., 2015). In addition, antidepressants are used for other conditions as well, such as anxiety, sleep disorders, chronic pain and in response to stressful life events (Demyttenaere et al., 2008). Antidepressant treatment should be combined with case management or collaborative care, which means scheduled follow-up, routine assessment of progression of symptoms, a strategy to enhance adherence to medication (which is often low), standardized assessment of symptoms and access to a mental health specialist (e.g. psychiatrist, psychologist) when required (Cleare et al., 2015).

The evidence-based guidelines for treating depressive disorders with antidepressants by the British Association for Psychopharmacology suggest that depression and consequently the treatment options for depression should be considered along three main dimensions – severity, chronicity (i.e. duration) and risk of relapse. These dimensions should be considered when assessing whether antidepressant treatment is beneficial (Cleare et al., 2015). In particular, this means that a depression diagnosis by itself should not warrant antidepressant treatment. Also, in some depressive disorders, with less severity and shorter duration, there is likely little benefit or indication for antidepressants (Cleare et al., 2015). For example according to a meta-analysis, there seems to be no clinical advantage for antidepressants over placebo in individuals with minor depression (Barbui et al., 2011).

Data on antidepressant prescriptions is commonly used as an objective measure for mental disorders that require medical treatment (Thielen et al., 2009). Antidepressant register data usually includes prescription dates, the number of defined daily doses (DDD) for prescription drugs and the the Anatomical Therapeutic Chemical (ATC) codes, which inform the type of medication (e.g. N06A for antidepressants) (WHOCC, 2012). In Finland, the Prescription Register, that contains these data, is kept by Statistics Finland. Sweden and Denmark has similar registers, specifically the Swedish Drug Prescription Register (Wettermark et al., 2013) and Danish National Prescription Registry (Kildemoes et al., 2011), which were also used in this study.

The prevalence of antidepressant prescriptions has increased in the past decades. For example, in Europe there was an average increase of 20% per year in 2000–2010 (Lewer et al., 2015). This trend has continued since then. During the study period of Study II in the Finnish sample the increase was from less than 60 DDD/1000

inhabitants/day in 2006 to about 70 DDD/1000 inhabitants/day 2011 (The Finnish Medicines Agency, 2023). After that, the rates decreased slightly until 2016, and after that the rates increased drastically to almost 90 DDD/1000 inhabitants/day. Among the prescriptions Escitalopram was the most commonly prescribed antidepressant. In total, about eight percent of Finnish people use antidepressants regularly, amounting to about 447 000 people (Duodecim, 2023).

When using antidepressant data as an indicator for mental disorders there are some issues to consider. First, as with sickness absence data, the validity of diagnosis is a central concern, because it impacts the treatment received (Allebeck, 2009). For example, a misdiagnosed condition may lead to false positives or false negatives, which impacts the validity of an antidepressant treatment measure. Second, validity may be compromised, because antidepressants are commonly prescribed for other conditions as well (Demyttenaere et al., 2008). The twelve-month prevalence of depression among antidepressant users is only 30–35% and lower among short-term users (Demyttenaere et al., 2008). Almost 60% of patients with depressive disorders discontinue treatment within 3 months from the beginning of treatment (Rossom et al., 2016). Also, a disappointingly low, about half of the patients experience remission of depression during 6–12 weeks of treatment with second-generation antidepressants (Gartlehner et al., 2007).

The effectiveness of antidepressants is a complex research question and multiple clinical factors can have an impact on whether an individual patient receives clinically significant reduction in symptoms that last in follow-up, without overly severe side effects (McCormack & Korownyk, 2018). Two factors are usually investigated in these studies: the effectiveness and acceptability (treatment discontinuations due to any cause, such as side effects) of the medication, and usually different types of antidepressants are compared. In general, studies suggest that antidepressants are effective compared with placebo among patients major depressive disorders, and different medication can have significantly better effectiveness based on clinical factors (Alemi et al., 2021; Cipriani et al., 2018; Yuan et al., 2020). Cipriani *et al.* (2018) concluded that all antidepressants were more efficacious than placebo, and smaller differences between active drugs were found when placebo-controlled trials were included in the analysis, whereas in head-to-head trials efficacy and acceptability varied between the types of medication. In practice, it seems that some antidepressants may not be effective for a specific individual and thus treatment should be assessed and adjusted. Further, it is not clear, whether antidepressants are effective among patients with milder forms of depression, but it may be that some studies underestimate the effectiveness of antidepressants in mild depression (Cipriani et al., 2018; McCormack & Korownyk, 2018).

A few issues are also important to consider regarding the studies about antidepressant treatment. The effectiveness of antidepressants in studies doesn't equate head-on with clinically significant reduction in depressive symptoms in practice (Hegerl et al., 2012; McCormack & Korownyk, 2018). A significant reduction in studies can for example be based on a reduction in scores of the Hamilton depression scale score (McCormack & Korownyk, 2018). For, example this can mean a change from a response "wishes s/he were dead" to "suicidality absent", or a clear improvement in appetite or sleep (Hegerl et al., 2012). Further, the meta-analysis by Cipriani *et al.* (2018) showed an estimated 82% of antidepressant studies had moderate to high risk of bias, and specifically biases were related to the novelty effect of medications (new medication rated more favourably than old) and the funding of studies by drug companies (78% of studies). On the other hand, funding, for example, was not associated with substantial differences in response of dropout rates.

These limitations should be considered when drawing conclusions from antidepressant data. In my dissertation some of these limitations play a smaller role, as antidepressants were used an indication of a mental disorder, rather than investigating their efficiency or acceptability. However, the issue of validity was an important concern, because antidepressant can be used for other conditions than depression. For higher validity, studies have applied a measure called defined daily dosage (DDD) to measure a specific dose or medication prescribed to the individual, which can be used to identify more precisely individuals with depression (Magnusson Hanson et al., 2013; Thielen et al., 2009). Specifically, a continuous treatment for at least 6 months can be measured by identifying individuals with >179 DDD of antidepressant treatment during 6 months, which may be a more accurate measure for depression than indicating depression with a measure for any amount of antidepressant prescriptions (Thielen et al., 2009). Thus, this measure was applied in Study II.

2.3 Job stress

Stress is a natural to a challenging situation that prepares the body and mind to function efficiently in that situation, but the accumulation of stress for long periods of time without psychological recovery can lead to psychological or psychological health problems (Geurts & Sonnentag, 2006; McEwen, 1998; McEwen, 2008). Stress can be seen as a response to an unexpected event, which leads to the release of chemical mediators (e.g. catecholamines that increase heart rate and blood pressure) that helps an individual cope with the circumstance (McEwen, 1998; McEwen, 2008). However, repeated elevation of these mediators produce in wear and tear for the body and brain, which can also lead to CMD, for example. This

active process is related to the concept of allostasis, which describes how the body responds to refers to the daily events and tries to maintain homeostasis (i.e. a state of stability) (Sterling & Eyer, 1988).

The definition of job stress can be divided into three areas: 1) stress as a stimulus, 2) stress as a reaction and 3) stress as an association between the individual and the environment (and the imbalance between the demands of the environment and the resources of the individual) (Sonnentag & Frese, 2004). For an employee a stress stimulus can be internal (e.g. a though, memory or interpretation of past, present or future events) of an external job stressor. For example, the National Institute for Occupational Health and Safety has defined job stressors into the following: job stressors related to job tasks (e.g. time pressure, role demands), organizational stressors (e.g. job insecurity, organizational barriers), relationship stressors (e.g. bullying, harassment) and personal stressors (e.g. work-family conflict) (Wiegand et al., 2012).

Stress reactions on the other hand can be divided according to the context of the reaction: reactions among individuals, work communities or in the private life, for example. Individual reactions include physiological (e.g. catecholamine and cortisol release), emotional (e.g. changes in mood, irritability and anxiety) and cognitive reactions (memory problems, lack of concentration, difficulties in making decisions) (Mäkikangas et al., 2017). For example, in the work community job stress as a reaction can spread to social problems in the work community or decreased commitment, which can be seen as emotional stress reactions by the work community (Mäkikangas et al., 2017).

The definition of stress as a relationship between the individual and the environment combines the stimulus and the reaction and highlights that the cognitive appraisal by the individual about the situation is central in the stress response. In this view, stress appears when the individual assesses that the demands of the situation exceed their resources and endanger their well-being (Lazarus & Folkman, 1984). Thus, cognitive appraisal, that is, how the individual interprets the stressor has a primary role in the stress reaction. In primary appraisal the individual assesses whether the stressor is significant for well-being (Lazarus & Folkman, 1984). These stressors are usually related to loss, threat or challenges. If the job stressor is viewed as a threat, it initiates secondary appraisal in the individual, which is targeted at assessing what can be done to cope with the stressor with the resources that are available (Lazarus & Folkman, 1984). Thus job stress is part of an active process of primary and secondary appraisal.

In the working population, harmful job stress leads to increased health problems among employees, financial losses for organizations and the society, and reduced efficiency and quality of work (Mäkikangas et al., 2017). Studies suggest that job stress has increased with the trend of increased work intensity during the past

decades (Greenan et al., 2014; Lopes et al., 2014; The Ministry of Economic Affairs and Employment in Finland, 2024). According to the barometer of working conditions by The Ministry of Economic Affairs and Employment in Finland, 17% of employees experienced a high amount of job stress (12% among men and over 21% among women) (The Ministry of Economic Affairs and Employment in Finland, 2024). Further, the risk of burnout, a possible consequence of prolonged exposure to harmful job stress, was increased among 9% of men and over 16% of women. Common burnout symptoms among employees included emotional exhaustion (15%), lack of interest for work (14%) and difficulties concentrating (14%). These figures indicate how it is important to identify factors that cause job stress in specific professions. Also, from the employers' standpoint, the identification of harmful psychosocial conditions and acting upon decreasing their adverse impact on health is required by law, in order to ensure a work environment that is safe and that supports the physical and psychological health of employees (Occupational Safety and Health Act 738/2002).

Theories of job stress in the working population have developed over time in the context of societal changes and have been influenced by the broader psychological literature (Moon et al., 2024). There are numerous theories of job stress, but some of the most cited ones, in chronological order include role stress theory (Kahn, 1964), the job Demand-Control model (JD-C) (Karasek, 1979) and the later revised job Demand-Control-support model (Karasek & Theorell, 1990), the person-environment fit theory (French et al., 1982), the transactional model of stress (Lazarus & Folkman, 1984), the conservation of resources theory (Hobfoll, 1989), the effort-reward imbalance model (Siegrist, 1996), and the job demand-resource model (Demerouti et al., 2001). We applied the JD-C and ERI models in this dissertation, because few studies have applied those to investigate job stress among social workers, and in particular it is not clear whether they are associated with the risk of CMD among social workers. Also, the JD-C model is one of the most prominent stress models in job stress research, by the measure of citations, and while ERI has been cited significantly less, it ERI is also a widely accepted stress model (Moon et al., 2024). Further, ERI in particular fits well with the human service profession sector as a stress model, because rewards from client work and the meaning of work are central characteristics to those professions. Next, I will present the JD-C and ERI models in more detail.

2.3.1 Job strain

In the JD-C model, the psychological work environment is characterized through the dimensions of job demands and control (Karasek, 1979). According to the model, a combination of high job demands and low job control (high job strain) is associated

with psychological stress and low job satisfaction (Figure 1; adapted from Karasek, 1979). By contrast, in the model low job strain (low job demands and high job control) predicts fewer health problems. In the JD-C model, job demands refer to high work load, which has been operationalized as time pressure and role conflicts (Van der Doef & Maes, 1999). Job control is also called decision latitude, which refers to the employees' ability to control their own work activities. This includes two components, namely skill discretion and decision authority (Van der Doef & Maes, 1999).

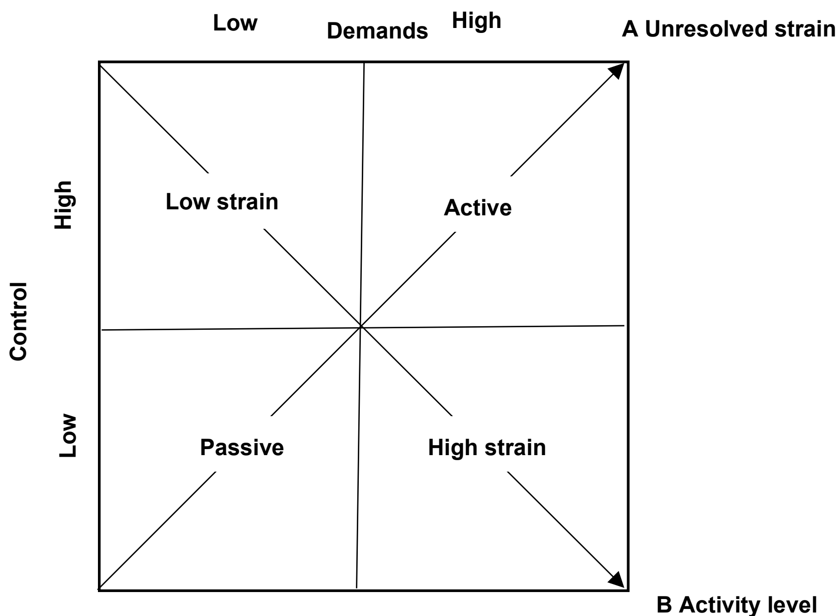

Figure 1. The Demand-Control Model (Adapted from "Job demands, job decision latitude, and mental strain: Implications job redesign" by R.A. Karasek, Jr. (1979) published in Administrative Science Quarterly, vol. 24 by permission of Administrative Science Quarterly ©).

The JD-C model separates between two mechanisms, strain and learning, as illustrated by the two diagonals in Figure 1, the strain diagonal for unresolved strain at work (A) and the activity diagonal (B) (Karasek, 1979). According to the model, the combination of high job demands and low control is associated with poor health outcomes (high strain quarter), whereas low demands and high control (low strain quarter) is associated with positive health outcomes. Low strain is not necessarily the optimal condition, however. The model suggests that jobs with high demands can be beneficial for health, motivation, and learning, when decision latitude is high (active quarter). That is, if the employee can face challenges and succeed in their goals, while having control over their jobs and being an active part of the

organization (e.g. being heard, ability to influence decisions), job demands can have a positive impact on health. In line with this, passive jobs are described with low demands and low control and they can also be a risk factor for employee health and motivation by reducing vigilance, motivation and job satisfaction. This can also lead to a lack of meaning and low mood. In the revised Job Demand-Control-Support model, it is hypothesized that social support can moderate the association between job control or job demands and well-being (Johnson & Hall, 1988; Karasek & Theorell, 1990; Moon et al., 2024).

2.3.2 Effort-reward imbalance

Work-related benefits for health and motivation are based on the notion of a reciprocal relationship between efforts and rewards at work, which is the basic premise of the ERI model (Siegrist, 1996). More specifically, efforts are the job demands and/or obligations that the employees face in their job. Rewards relate to money, esteem and job security/career opportunities. In the model, ERI describes a situation where employees put more efforts to their work than what they receive as intrinsic or extrinsic rewards (Siegrist, 1996). The hypothesis is that a reciprocal relationship between these “costs” and “gains” is vital for employee health, and an imbalance leads to active strain and health problems (Siegrist, 1996). Further, the model states that employees who rank high in the personality characteristic overcommitment (i.e. a motivational pattern reflecting high ambition and high need for approval and increased self-esteem), are more likely to experience strain due to ERI (van Vegchel et al., 2005). The ERI model is presented in Figure 2 (adapted from Siegrist, 1999).

According to the ERI model, a satisfying work role is important in fulfilling self-regulatory needs of the employee (van Vegchel et al., 2005). Self-regulatory needs include the opportunities to acquire self-efficacy (e.g., successful performance), self-esteem (e.g., recognition) and self-integration (e.g., belonging to a significant group). The employee experiences work as an act of social exchange and expects consciously or subconsciously that the efforts and rewards meet (i.e. reciprocity). In the case of an imbalance, the self-regulatory needs are not met, which can lead to negative emotions and activate somatic stress responses (Henry & Stephens, 1977). Stress research shows that sustained activation of the autonomic nervous system increases the risk of somatic (e.g., cardiovascular) and mental (e.g., depression) disorders (Weiner, 1992). Studies using the ERI framework have later supported these claims by reporting associations with various neurobiological, psychological and behavioural health factors (van Vegchel et al., 2005).

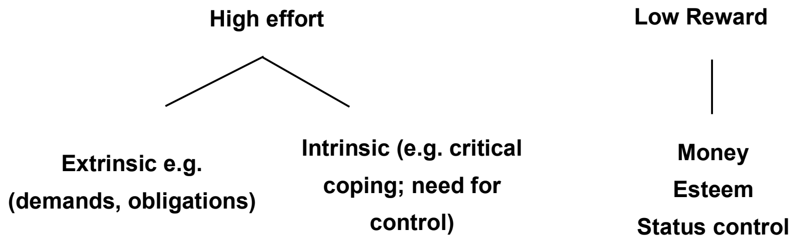

Figure 2. The Original ERI model (Adapted from “Adverse health effects of high-effort/low-reward conditions” by J. Siegrist (1996) published in the Journal of Occupational Health Psychology, vol. 1 by permission of the American Psychological Association ©).

The model further suggests that individuals will try to avoid ERI by reducing efforts cognitively or behaviourally and maximize rewards (van Vegchel et al., 2005). These notions are based on the cognitive theory of emotion (Lazarus, 1991) and the expectancy theory of motivation (Schönpflug & Batman, 1988). Thus in theory, ERI would not influence health in the long-term, because employees would exit the stressful situation or change the circumstances. However, in practice there can be at least three circumstances that maintain ERI: 1) when there are no alternative choices in the labour market, 2) if the employee expects future gains and waits for those strategically and thus remains in the stressful situation, and 3) when the employee rates high on overcommitment (Hanson et al., 2000; Siegrist, 1996). Further, ERI may not be a conscious experience, and it can thus be a chronic stress experience for the unaware individual (Siegrist, 1996).

2.3.3 Job stress as a risk factor for common mental disorder

Prolonged job stress can eventually lead to sickness absence due to common mental disorders (Clausen et al., 2012; Duchaine et al., 2020; Götz et al., 2018; Heinonen et al., 2022; Leineweber et al., 2020) or disability pension (Juvani et al., 2014; Kivimäki et al., 2004; Laine et al., 2008; Samuelsson et al., 2013). Also, high job stress has been associated with an increased risk of antidepressant treatment (Kivimäki et al., 2007a; Magnusson Hanson et al., 2013; Nielsen, 2016; Thielen et al., 2011; Virtanen, 2008; Virtanen et al., 2007). In particular, both job strain and ERI have been highlighted as major risk factors for CMD in the general working population (Duchaine et al., 2020; Madsen et al., 2017; Theorell, 2015; Van Der Molen et al., 2020). However, few studies have investigated whether job strain or ERI are associated with the risk of CMD among human service professionals or social workers (van Vegchel et al., 2004).

Two studies did investigate the mediating effect of various psychosocial factors for sickness absence among human service professionals (Aagestad et al., 2016; Aronsson et al., 2019). In a study including only female employees, no mediating effect of job strain for the risk of sickness absence was found among health and social care professionals compared with other professionals (Aagestad et al., 2016). Similarly, in another study no mediating effect of ERI for the risk of sickness absence among human service professionals compared with non-human service professionals was observed (Aronsson et al., 2019). Instead, both studies showed that client work factors mediated the risk of sickness absence among the studied human service professions (Aagestad et al., 2016; Aronsson et al., 2019). However, in those studies social workers were not investigated specifically.

Although few studies have investigated job strain and ERI among social workers and their association with the risk of CMD in social work, studies have identified similar psychosocial risk factors in social work (Blomberg et al., 2015; Johnson et al., 2021; Mcfadden, 2015; Ravalier, 2019; Ravalier et al., 2020; Rugulies et al., 2009; Saarinen et al., 2012; Tham, 2018). For example, job demands in social work are commonly related to factors such as time pressure, high amount of paperwork, administrative tasks and few opportunities for rewards from client work (Johnson et al., 2021; Ravalier et al., 2020). Also, social work includes tasks that are important and highly urgent, which likely increases the experience of job stress and time pressure among the employees. In Finland in child welfare services, for example, the social worker must begin the assessment of the service needs of a child in need of special support no later than the seventh business day after the case has been initiated, and the assessment must be completed within three months after the case was initiated at the latest (Social Welfare Act 1301/2014). Naturally a situation may also require quicker actions, if it is a case that requires the Emergency Social Services.

The other side of these JD-C and ERI models is the degree of resources (i.e. job control or rewards at work) the employee experiences. Few studies have investigated these resources in social work either, but studies indicate that possibilities for experiencing rewards at work, for example, may be low in social work (Jönsson, 2005; Tham, 2021), which indicates ERI could be low in social work. Indeed, one study found that social workers had the second highest ERI compared with multiple human service and non-human service professions (Rugulies et al., 2009). The highest ERI was reported for public sector executives, and other professions with high ERI included managing clerks in the public sector, medical secretaries, and police and correction officers, for example. Despite these results, social work can be a highly rewarding profession from an ethical perspective, because it's basis is in helping others in need and fostering human rights values, as well as defending the values of the Nordic welfare state (Blomberg et al., 2010; International Federation

of Social Workers, 2018; Kröger, 2011). Thus, social work at least has the potential for being highly rewarding.

However, multiple studies show that social worker often work in adverse psychosocial conditions and these findings further suggest that job stress may be higher in social work compared with most other human service professions (Aronsson et al., 2014; Borritz et al., 2006; Madsen et al., 2010; Rugulies et al., 2009; Tham & Meagher, 2009). Also, one study reported that social workers have a lower probability of recovering from work due to high psychosocial demands (Aronsson et al., 2014). In particular, child welfare professionals are at a high risk for burnout and are likely to change jobs due to high job demands and low resources (Baldschun et al., 2019; DePanfilis & Zlotnik, 2008; Kim & Kao, 2014; Mcfadden, 2015; Mor Barak et al., 2001; Sage et al., 2018; Sprang et al., 2011; Tham, 2007, 2018; Tham & Meagher, 2009; Travis et al., 2016). Further, one study reported more adverse conditions on several measures of workload, complexity of tasks and lowers quality of management among social workers in child welfare compared with preschool teachers and primary education teachers, as well as hospital workers (Tham & Meagher, 2009). Thus, higher job strain and ERI in social work could explain why some studies have shown a particularly high risk of CMD among social workers compared with other professions (Buscariolli et al., 2018; Lidwall et al., 2018; Kokkinen et al., 2019; Wieclaw et al., 2006). Thus more studies are needed to investigate whether social workers have a higher risk of work disability due to CMD, and whether this risk in mediated by job strain or ERI.

3 Aims of the Study

The aim of this study was to 1) analyse the risk of CMD among social workers compared with other human service and non-human service professionals, and 2) to investigate whether job stress mediates the excess hazard of work disability due to CMD among social workers. In Study I, social workers were compared with preschool teachers, special education teachers and psychologists for the risk of work disability due to CMD and probability of returning to work (RTW) after work disability among in Finland and Sweden. Analyses were performed separately in each cohort. In Studies II and III, three larger reference groups were used, namely health and social care, education and non-human service professions. In Study II, the hazards ratio (HR) of antidepressant treatment among social workers was analysed by comparing hazards among social workers with the three reference professions. In Study II, we included cohorts in Finland, Sweden and Denmark. Analyses were done separately in each cohort, and in addition we performed a meta-analysis with all cohorts included. In Study III, register data on work disability due to CMD was combined with questionnaire data in a cohort of Finnish public sector employees. The risk of work disability due to CMD was analysed among social workers compared with health and social care, education and non-human service professions. In addition, in those associations where social workers had a higher risk of work disability due to CMD, mediation of excess hazards by job strain and ERI was investigated.

Based on these aims, the following hypotheses were tested:

1) Social workers have a higher risk of work disability due CMD compared with other human service professions. (Studies I and III)
2) Social workers are less likely to RTW due to longer duration of sickness absence spells than other human service professionals with a comparable socioeconomic status (SES). (Study I)
3) Social workers have a higher risk of incident or long-term antidepressant treatment compared with other human service professionals. (Study II)

4) In those comparisons where social workers have a higher risk of work disability due to CMD, the association between employment in social work and work disability due to CMD is mediated by higher job strain and ERI in social work. (Study III)

4 Methods

4.1 Data sources

This thesis was based on data from the Finnish Public Sector study (FPS), which was used in all three studies, and data from The Insurance Medicine All Sweden project (Study I and II) the All Denmark cohort, which was formed by combining data from multiple registers for Study II.

4.1.1 Finnish Public Sector Study

The FPS is an ongoing questionnaire study that was initiated in 1997/1998 by the Finnish Institute of Occupational Health (Kivimäki et al., 2004; The Finnish Institute of Occupational Health, 2025). Data from the questionnaire was used in Study III by combining questionnaire data with register data. During the period of the current study in the FPS samples, i.e. 2005–2011, the FPS targeted personnel, aged 18–65 years, from 10 municipalities (Espoo, Vantaa, Tampere, Turku, Oulu, Raisio, Nokia, Valkeakoski, Naantali, Virrat) and five hospital districts, or health and social services organizations (hospital districts of Kanta-Häme, Vaasa, Pirkanmaa, Welfare District of Forssa, and Public Social Services and Health Care in the Jakobstadt region) in Finland. The data for the current studies were drawn from multiple Finnish registers, which the FPS has data-linkage for via personal identity codes assigned to all citizens in Finland. These were the register for sickness absences held by the Social Insurance Institution of Finland (sickness absence), the pension register held by the Centre for Pensions (disability pension and old-age pension), The Prescription Register held by Statistics Finland (Antidepressant treatment and Defined daily dosages), the Drug Reimbursement Register kept by the Social Insurance Institution of Finland (chronic somatic diseases at baseline), the Finnish Cancer Register (information on malignant tumours diagnosed during the preceding 5 years), the Finnish death register (being alive at baseline), the register for area of residence held by Population Centre of Finland (area of residence) and the employers records (age, sex, occupation and employment history).

4.1.2 Insurance Medicine All Sweden study

IMAS is a large-scale dataset that is used in research that aims to generate knowledge about sickness absence and disability pension. Information of the project and an updated list of studies that have used the data (and further descriptions of the dataset) is presented on the project's website (Karolinska Institutet, 2024). The dataset covers the entire working-aged (16–64 years) population in Sweden. The dataset has been linked via personal identification numbers assigned to each citizen living in Sweden with nationwide registers administered by Statistics Sweden (e.g., LISA - The Longitudinal Integrated Database For Health Insurance And Labour Market Studies), the National Board of Health and Welfare (e.g. Patient Register, Prescribed Drug Register, Cancer Register, Cause of Death Register) and the Swedish Social Insurance Agency (e.g., the database Micro-Data for Analysis of the Social Insurance System) (Karolinska Institutet, 2024).

From LISA data was included on occupation, sickness absence dates with diagnoses, sex, age, marital status, educational level, area of residence, emigration, income, old-age or disability pension and employment. From the Patient Register data was included on in- or outpatient treatment for chronic somatic diseases or mental disorders. From the Prescribed Drugs Register data was included on antidepressant treatment with defined daily dosages. From the Cause of Death Register data was included on death dates. From the Cancer register data was included on malignant tumours.

4.1.3 All Denmark cohort

Data from the All Denmark cohort were used in Study II. The cohort included all working-aged employees (18–63 years) living in Denmark, who were employed in human service professions and office work. The cohort was formed by combining data from multiple nationwide registers for Study II at Statistics Denmark by means of the individuals' personal identification numbers attributed to all Danish inhabitants. Sociodemographic information (age, gender, civil status, retirement, income, immigration, immigrant status, education, area of residence and marital status) was derived from the following registers: the Population Statistics Register, the Education Register, the Income Statistics Register, a register for immigration or emigration (VNDS), the Employment Classification Module and the Coherent Social Statistics register. Morbidity (in- or outpatient treatment for chronic somatic diseases or mental disorders) and mortality data (cardiovascular, cancer and respiratory disease, diabetes, and all-cause mortality) was derived from two Danish Death registers and Danish Patient registers. Filled prescriptions for medications were derived from The Danish National Prescription Registry (antidepressants,

anxiolytics, hypnotics and sedatives). Information on sickness absence was derived from the Danish Register for Evaluation of Marginalisation.

4.2 Study populations

FPS data was used in each study, IMAS data was used in Studies I and II and data from Denmark was used in Study II. In all studies the main inclusion criteria was employment for at least 6 months in the calendar year preceding baseline in social work or the selected reference professions. In Finland, occupational titles to identify social workers were also screened by an independent researcher to ensure that they were employed in social work organizations, but this resulted in only marginal exclusion in the FPS sample. The baseline was set on January 1st in different years across the studies: 2005 in Study I, 2006 in Study II, and either 2005 or 2009 (depending on the participant's questionnaire response year) in Study III. Follow-up ended in 2011 in Studies I and III. In Study II, the end of follow-up was 2011 in Finland, 2014 in Sweden, and 2016 in Denmark, to ensure the longest follow-up available for each dataset. Follow-up times are presented in Figure 3.

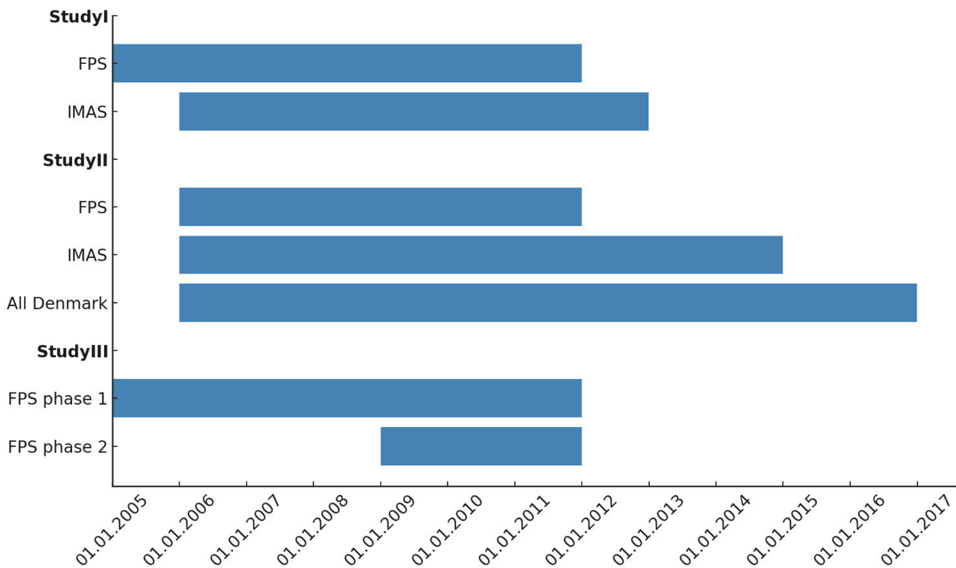

Figure 3. Follow-up times in each cohort in all studies.

There were some differences between studies in addition to the follow-up times, reference professions and study outcomes between studies and between cohorts in each study. First, in all FPS cohorts the social workers were screened for valid

employment titles by an independent researcher, who was also an experienced social worker, to improve the validity of ISCO codes. Second, in Study II, in the Swedish and Danish cohorts individuals were screened annually for a change in ISCO codes and excluded if they changed professions. In the Finnish cohort there was no data on turnover available to investigate dropout from occupation during follow-up. Also, in Study II in Sweden and Denmark gainful employment was based on main income from work in contrast to income from social assistances, and social workers were screened for education and only those with higher education than bachelor level education were included as social workers. Those with lower bachelor level education were defined as social care associate professionals, in order to harmonize data between cohorts.

In all studies the main exclusion criteria were on-going disability or old-age pensions or sick leave (>1 year) at baseline and being alive at baseline. Also, in the FPS cohort in Studies II and III, employees of the City of Tampere were not included, because national register data on medication use was not available due to the employer's own benefit fund. Flowcharts for the formation of the study population are presented for each study separately in Figures 4–6. In addition, brief summaries for the similarities between studies and each study are presented below in text.

4.2.1 Study I

In Study I, data were used from two prospective cohorts: the FPS, years 2005–2011 and the Insurance Medicine All Sweden database, years 2005–2012 (Figure 3.). In both cohorts, the outcome was work disability (>14 days) with mental diagnoses (ICD-10 codes F00–F99; (World Health Organization, 2019), with data drawn from national health registers. The occupational groups were social workers (N^{FPS} = 1,155; N^{IMAS} = 23,704) that were compared with three other groups of human service professionals: preschool teachers (N^{FPS} = 2,419; N^{IMAS} = 74,785), special education teachers (N^{FPS} = 832; N^{IMAS} = 14,004) and psychologists (N^{FPS} = 443; N^{IMAS} = 6,726). These reference groups were selected, because the aim was to include human service professions with a comparable SES with social workers. In total, the Finnish sample comprised 4,849 employees and the Swedish 119,219 employees. In IMAS, inclusion criteria were as similar as possible compared with the Finnish cohort. A detailed cohort selection is shown in Figure 4.

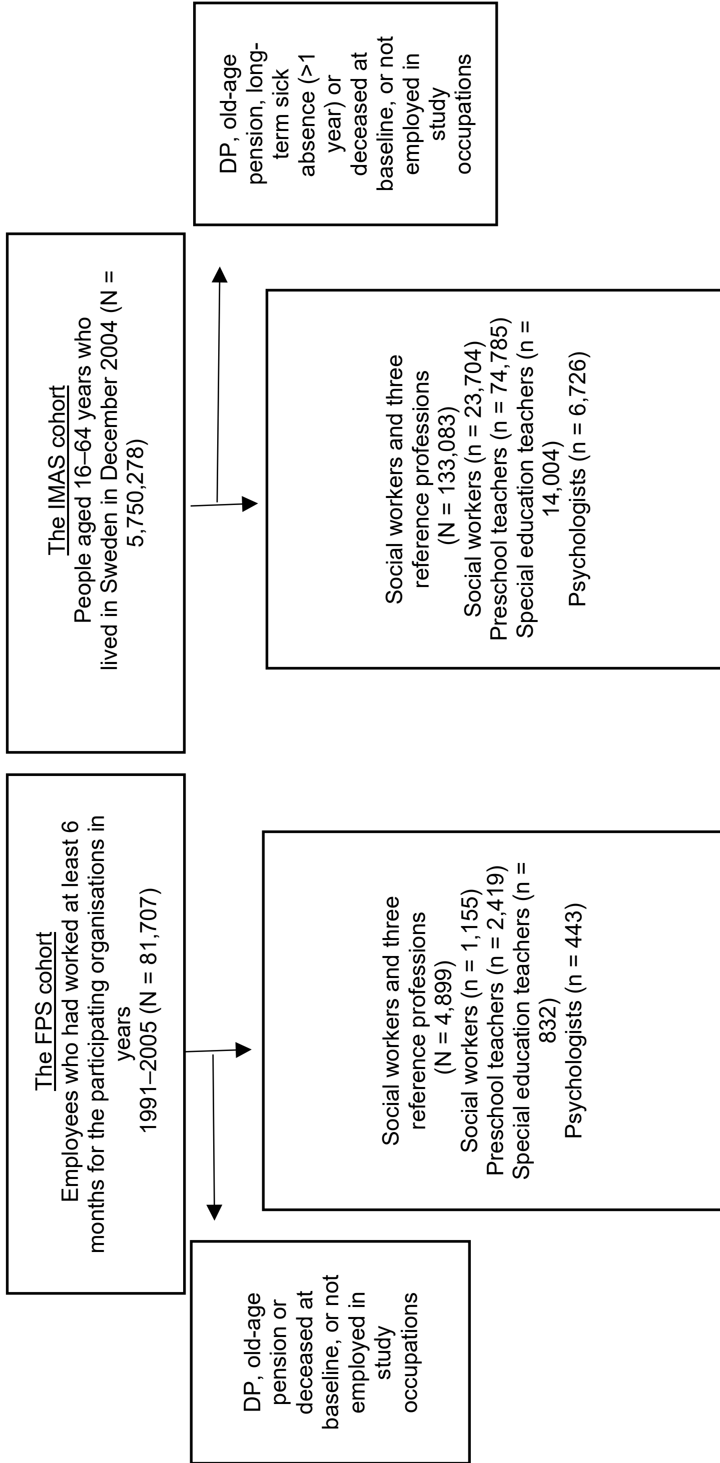

Figure 4. Flow diagram of sample selection in Study I.

4.2.2 Study II

In Study II, data were used from three prospective cohorts: the FPS study, years 2006–2011, and nationwide cohorts in Sweden and Denmark, years 2006–2014 and 2006–2016 respectively (Figure 3.). Employees were selected from social work and two other human service sectors (health and social care and education professions) and a group of non-human service professionals in the cohorts (secretaries). In Sweden and Denmark, social workers with a bachelor level degree, were defined as associate social care professionals, to harmonize data between countries. In each cohort, the outcome was prescriptions for antidepressant treatment (ATC code N06A) (WHOCC, 2012), which was derived from nationwide drug prescription registers. In total, the sample comprised of 1.5 million employees in social work (N = 26,287), other social and health care professions (N = 663,558), education professionals (N = 389,640) and non-human service professionals (office workers and secretaries) (N = 462,610). By country, the sample was 29,096 employees from Finland, 357,867 from Denmark and 1,155,132 from Sweden. A detailed cohort selection is shown in Figure 5.

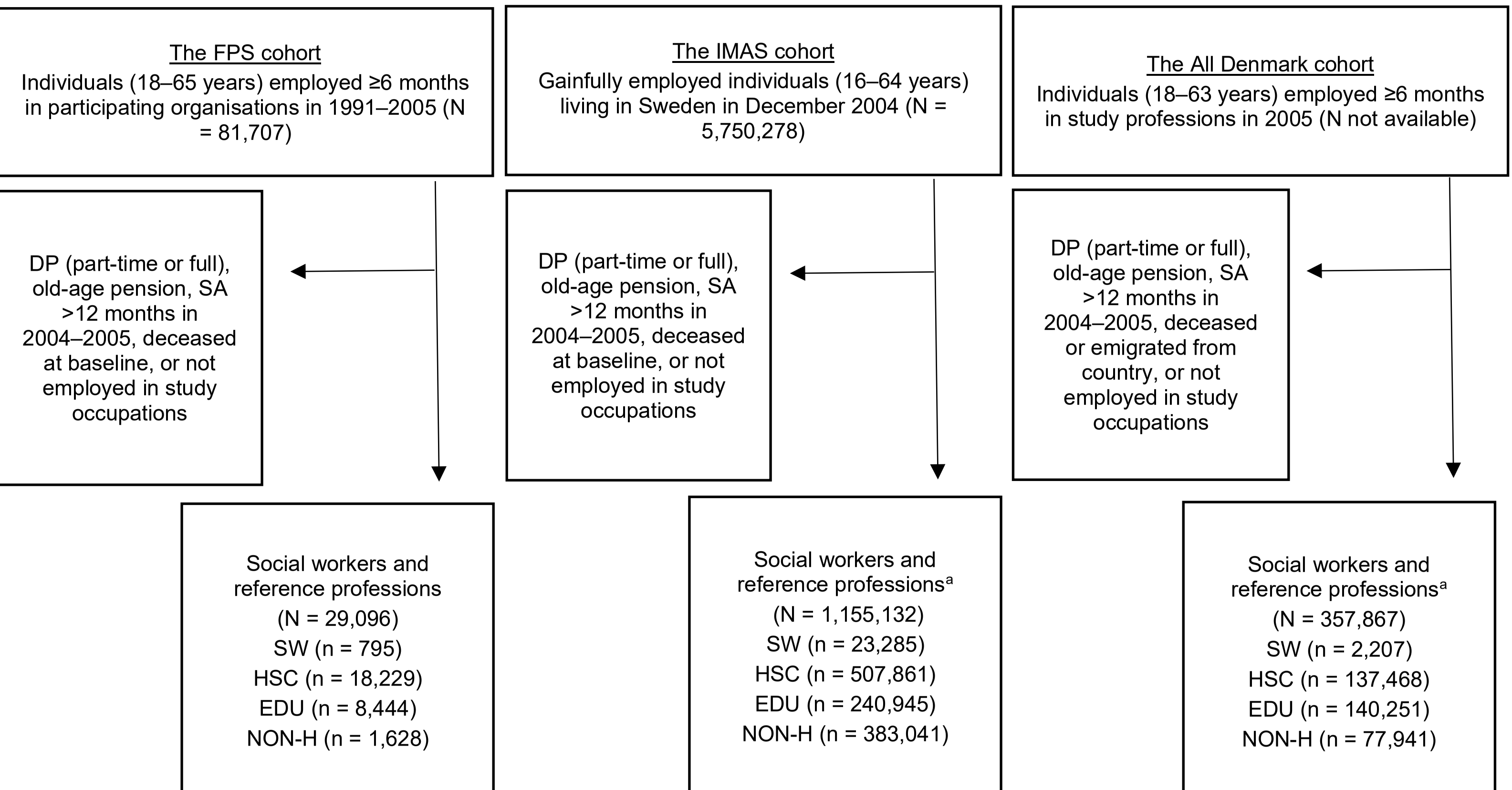

Figure 5. Flow diagram of sample selection in Study II. [a] Social workers with a bachelor level education were defined as social work associate professionals, to harmonize data between countries;SA = Sickness absence; SW = Social workers; HSC = Health and social care professionals; EDU = Education professionals; NON-H = Non-human service professionals

4.2.3 Study III

In Study III, questionnaire data from the FPS from years 2004 and 2008 on job strain and ERI were linked with records of work disability (sick leave or disability pension) due to mood (ICD-10 codes F30–F39) and anxiety disorders (F40–F48) obtained from national health and retirement registers held by the Social Insurance Institution of Finland and Finnish Centre for Pensions. The study sample was first constructed by including all employees who responded to the 2004 survey. Employees who responded to the 2008 survey but not the 2004 survey were then added. For individuals who responded to both surveys, only their 2004 responses were used (Figure 3.). The inclusion criteria required participants to have had employment for at least six months, be alive, not receiving part-time or full old-age pensions, be between 18 and 63 years old at baseline, be healthy at baseline (i.e., no ongoing sickness absence spell of ≥90 days and no antidepressant treatment exceeding 30 defined daily doses), and have available data on antidepressant use. Employees from the City of Tampere were excluded due to the lack of antidepressant data. Finally, participants were restricted to those employed in social work, other health and social care professions, education, or non-human service professions (e.g., office workers and secretaries). The analytic sample comprised of 16,306 respondents: 10,304 (63%) respondents from the 2004 survey and 6,002 (37%) respondents from the 2008 survey. Of those, 535 were social workers, 5,711 other health and social care professionals, 7,411 education professionals, and 2,619 non-human service professionals. A detailed cohort selection is shown in Figure 6.

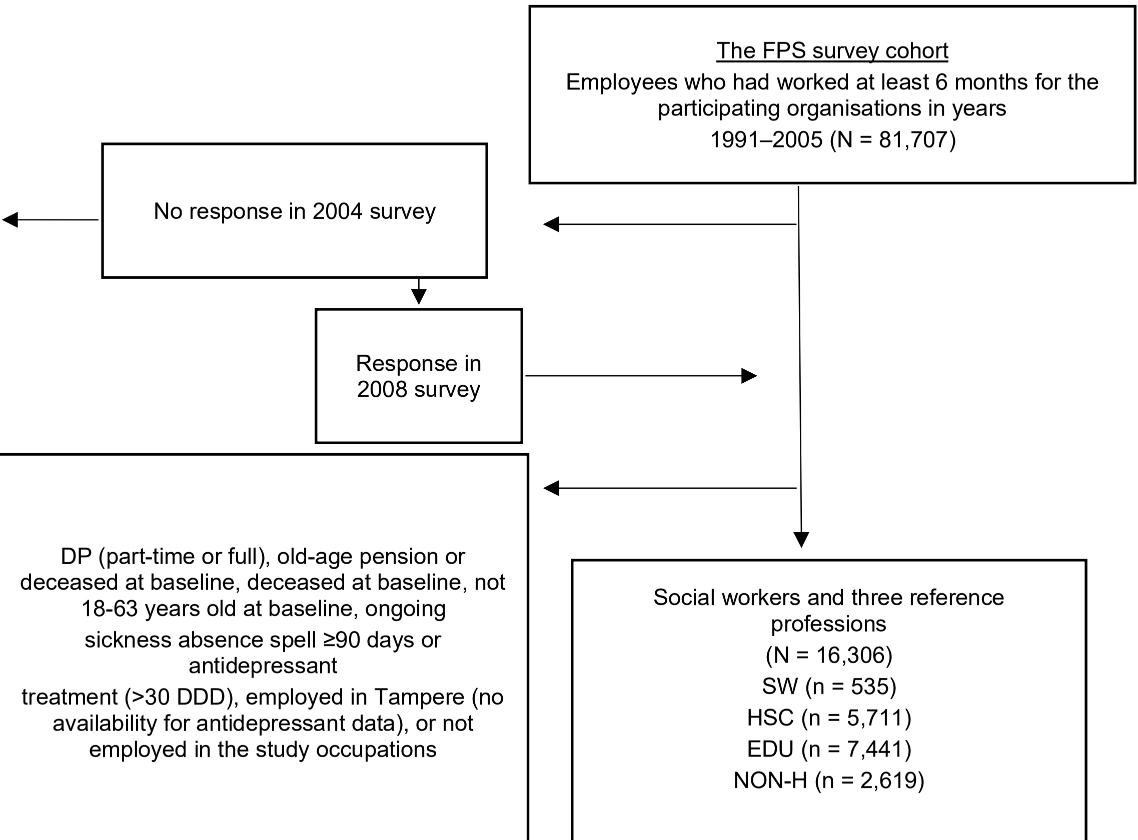

Figure 6. Flow diagram of sample selection in Study III. SW = Social workers, HSC = Health and social care professionals, EDU = Education professionals, NON-H = Non-human service professionals.

4.3 Operationalization

An overview of the exposures, covariates, mediators and outcomes in each study are presented in Table 3. In addition in Study III job strain and ERI were included as mediators. The following sections present these in further detail.

Table 3. Main information on variables used in each study.

Study	Cohorts	Exposure	Covariates	Outcome
I	FPS and IMAS cohorts	Employment in 2004 in social work compared with three reference professions individually: preschool teachers, special education teachers and psychologists	• Age • Sex • Area of residence • Marital status (not in FPS) • Chronic somatic disease before baseline or work disability with mental diagnoses (ICD-10 codes F00–F99) before baseline (not in Sweden)	Work disability spells (Sickness absence spells >14 days or any disability pension) due to mental disorders (F00–F99) in 2005–2011
II	FPS, IMAS and All Denmark cohorts	Employment in 2005 in social work compared with three reference professions individually: Other health & social care professionals, Education professionals and Non-human service professionals	• Age • Sex • Marital status (not in FPS) • Area of residence, Chronic somatic diseases, malignant tumours or hospitalization due to mental disorders • All-cause sickness absence benefits before baseline (yes/no)	Prescriptions for antidepressant treatment (ATC code N06A): 1) any prescriptions or 2) > 179 DDD prescriptions during 12 months (>89 DDD during 67 months in Sweden) in 2006-2011
III	FPS	Employment in 2005 in social work compared with three reference professions individually: Other health & social care professionals, Education professionals and Non-human service professionals	• Age • Sex • Job contract (temporary/permanent) • Body mass index (BMI, < 25 kg/m2 = not overweight, > 25 = overweight) • High-risk alcohol consumption (> 288 g/week for men and > 192 g/week for women = “yes”, below high-risk use = “no”) • Current smoking (yes/no) • Physical activity (> 14 metabolic equivalent task [MET] hours/week = yes, below recommended MET = no)	Work disability spells (Sickness absence spells >10 days or any disability pension) with CMD ICD-10 diagnoses: mood (F30–F39) or anxiety disorders (F40–F48) in 2006–2011

4.3.1 Exposure

In all studies, the exposure was employment in social work at baseline and employment for at least 6 months in the preceding year before baseline. Exposure was specified by using occupation-pairs as exposure variable, that is, social workers were compared with each reference profession separately as pairs (e.g. social workers vs. education professionals). The reference groups were the same in studies II and III (health, social care professions, education professions or non-human service professions). In Study I, only preschool teachers, special education teachers and psychologists were included. In each study, the Classification of Occupations applicable in that country was used to identify employment in the professions (Danmarks Statistik, 2011; Statistics Finland, 2001; Statistics Sweden, 2012). The occupations included in the studies and the occupational codes that were used to identify them are summarized in Table 4.

In the FPS data, the validity of the codes for social workers were screened by viewing the occupational titles in employers' registers by an experienced social worker and researcher. This was done in order to reduce potential random errors in ISCO coding that had led to employees being falsely coded as social workers. Those who did not likely perform social work were removed (e.g. the title of curator can be used for social worker at school or an employee of a museum). This led to only few individuals being removed. In Finland, all social workers have a higher education. In Sweden and Denmark, only social workers with higher education than bachelor level were included in the current sample as social workers, and others were specified as associate social care professionals, to harmonize data between countries. In Study II, annual data for occupation was used to identify turnover from social work as censoring criteria in Sweden and Denmark during follow-up. This was defined as any different occupational code than the occupational code assigned before baseline. Data were available only on a yearly basis, so the date was estimated as July 1 at a given year. For other occupations, data on turnover was not used.

In Study II, with the IMAS and All-Denmark data additional criteria on employment were used. First, employment was defined as having higher income from work and work-related social incomes than old-age pension benefits, to indicate being gainfully employed in working life. In Denmark, also unemployment benefit data was included to indicate that the employee had over 50% of their income from work and not unemployment benefits.

Table 4. Occupational groups in Finland, Sweden and Denmark and the major occupational groups.

SECTOR	OCCUPATION	FPS (STUDIES I–III)[A]	IMAS (STUDY I AND II)[B]	ALL DENMARK (STUDY II)[C]
Social work	Social workers	2446[d]	2492	2446
Health &social care	Medical doctors	2221	2221	2211
	Psychologists	2445[d]	2491	2445
	Physiotherapists	3226	3226	3226
	Nursing and midwifery professionals and associate professionals	223, 323, 51321, 51322, 51324	3231, 3232, 3233, 3234, 3235, 3239, 2231, 2232, 2233, 2234, 2235, 2236, 5132	223,323
	Social work associate professionals	3460	3461, 3462, social workers (2492) with bachelor level education	3460, social workers (2446) with bachelor level education
	Home-based Personal care workers	5133	5133	5133
Education	Secondary education teaching professionals	231, 232	2321, 2322, 2323	231, 232
	Primary education teaching professionals	2331	2330	2330, 2331
	Pre-primary education teaching professionals	2332[d]	3310	3320
	Special education teaching professionals	2340[d]	2340	2340
Non-human service	Administrative and executive secretaries and General, keyboard and customer clerks	41, 42	3431, 3432, 3433, 4111, 4112, 4120, 4131, 4132, 4140, 4150, 4190, 4211, 4212, 4213, 4214, 4215, 4221, 4222, 4223, 4224	3431, 3439, 411, 419, 42

[a] Classification of Occupations 2001 (ISCO-88); [b] Swedish Standard Classification of Occupations 2012; [c] The national version of the International Classification of Occupations in Denmark (DISCO-88); [d] Included in Study I

4.3.2 Outcomes

In Study I, in both the FPS and IMAS cohorts the employees were linked to nationwide records of sickness absence (>9 days in Finland; >14 days in Sweden) and disability pension (temporary, permanent, full-time and part-time in Finland; and 75% or full-time in Sweden). Data on sickness absence spells were obtained from a register kept by Social Insurance Institution of Finland, that handles reimbursements for sickness absence spells >10 days (the first day is a waiting day, days 2–10 are reimbursed by the employer). The Social Insurance Institution may pay sickness absence benefits for up to 300 days during two consecutive years. After that period, the employee has to apply for temporary or permanent disability pension or return to work. Data on disability pensions were obtained from the Finnish Centre for Pensions. In Sweden, information on sickness absence (>14 days) and disability pensions (75% or full-time) were obtained from the Social Insurance Agency, regarding main diagnoses (ICD-10) and start and end dates. The employee has to present a physician's certificate from the day 8 of sickness. Up to 2008, there was no maximum time limit for sick leave, but the duration of sickness absence has since been set at 364 days in the period of 15 months. In cases of serious disease, extended sickness benefit can be granted for additional 550 days (in all 914 days).

Follow-up was 2005–2011 in Finland and 2005–2012 in Sweden. Overlapping and consecutive spells were combined, assigning the diagnosis of the first period to the entire combined period. To harmonise the data between Finland and Sweden, sickness absence spells >14 days were analysed in both countries. In the analysis work disability spells with any mental diagnosis (ICD-10 codes F00–F99) were investigated, and in sensitivity analyses the risk of work disability due to depressive disorders (F32–F34) and stress-related disorders (F41, F43) was additionally investigated. For comparison, additionally trends in work disability with somatic diagnosis (all non-F-diagnoses, ICD-10) were examined. Finally, in Study I, also the duration of work disability was used as an outcome to analyse the probability of RTW. Duration of work disability period was calculated as days from the beginning of work disability to the date of RTW, the participant was granted an old-age pension (in Sweden 31st December in the year of 65th birthday), died, or the follow-up ended.

In Study II, purchases of antidepressants with data on ATC codes and number of defined daily dosage (DDD) were used as an indicator of a CMD (WHOCC, 2012). Data was obtained on prescription dates and DDD for prescription drugs with the ATC code N06A (antidepressants; non-selective monoamine reuptake inhibitors, Selective serotonin reuptake inhibitors, non-selective Monoamine oxidase inhibitors, Monoamine oxidase A inhibitors and "other antidepressants") from the beginning of 2004 to the end of 2011 in Finland, end of 2014 in Sweden and end of 2016 in Denmark. Two definitions of antidepressant treatment were used: 1) any

treatment during the follow-up, defined as at least one purchase during follow-up (the first date), and 2) long-term antidepressant use, defined as using antidepressants for more than 6 months (>179 DDD) during a 12-month period (Andersen et al., 2009; Magnusson Hanson et al., 2013). In Finland and Denmark, the >179 DDD treatment during 12 months was estimated by scanning each prescription and the 365 days before that. In Sweden, the cut-off was half of that, >89 DDD treatment during 6 months, due to data availability for only 6 months retrospectively at the baseline (from June 2005). If the rate accumulated over the cut-off, that index prescription date was defined as the event date.

In Study III, data on sickness absence were derived for spells that were ≥11 days long and disability pensions (temporary, permanent, and full- and part-time) with CMD ICD-10 diagnoses: mood (F30–F39) or anxiety disorders (F40–F48) (World Health Organization, 2019). Data on sickness absence spells were obtained from a register kept by Social Insurance Institution of Finland, and data on disability pensions were obtained from the Finnish Centre for Pensions. Next, work disability spells due to CMD were calculated by combining overlapping and consecutive spells, using the diagnosis of the first period. Follow-up for work disability spells due to CMD began on 1 January the year after the survey response and ended at the first occurrence of the studied outcome (sickness absence or disability pension due to CMD), old-age pension, death, or end of the register data availability at 31 December 2011. Mean follow-up was 4.8 (SD 2.2) years.

4.3.3 Covariates

In Studies I and II, the following covariates were included: age, sex, area of residence and chronic somatic diseases before baseline. In Study I, also work disability with mental diagnoses (ICD-10 codes F00–F99) in 2004 were included in the FPS sample. In Study II, all-cause sickness absence, and in- and/or outpatient treatment of mental disorders before baseline (no data on outpatient treatment in Finland) were also included. In Sweden and Denmark marital status was also included. Some covariates were specified differently in cohorts, as described below.

Area of residence was coded differently between countries. In Finland it was coded in two categories: 1) Capital region (Helsinki, Vantaa and Espoo areas) and 2) other regions from the participating organizations in the FPS study. In Sweden it was coded in three categories: 1) Big city (Stockholm, Gothenburg and Malmo), 2) Medium size city (>90 000 inhabitants within 30 km distance) and 3) Small city (≤90 000 inhabitants within 30 km distance). In Denmark it was coded in two categories: 1) Capital region (Hoevstaden) and 2) Other regions (Nordjylland, Midtjylland, Syddanmark, Sjælland).

Chronic somatic diseases before baseline was calculated differently between countries in studies I and II. In Study I data was available for 1.1.2000–31.12.2004. In FPS data, data were gathered from the Drug Reimbursement Register for 1) the incidence of diagnosed prevalent hypertension, cardiac failure, ischemic heart disease, diabetes, asthma or other chronic obstructive lung disease and rheumatoid arthritis and 2) from the Finnish Cancer Register for information on malignant tumours diagnosed during the preceding 5 years.

In Sweden and Denmark, chronic somatic diseases were measured with data on chronic somatic diseases from 1995 (2000 in Sweden) and for malignant tumours from 2000 (1995 in Denmark). In these cohorts, the data for chronic somatic diseases was based on 1) in- or specialised outpatient treatment with diagnoses for cardiovascular diseases and prevalent hypertension, diabetes, asthma or other chronic obstructive lung disease or rheumatoid arthritis, or 2) malignant tumours. In Study II mental disorders from 1995 (2001 in Sweden; no outpatient data in Finland) was additionally included as part of this covariate (morbidity before follow-up). The second health-related covariate in Study II was all-cause sickness absence benefit spells (after the employer compensated period) in 2004–2005. In Finland sickness absence spells of ≥14 days were included, and in Denmark and Sweden, sum of sickness benefit days of ≥14 days in 2004 or 2005 was used, even if spells were separate.

Study III included mostly different covariates to the previous studies. We included questionnaire-based data from the FPS survey from years 2004 and 2008 (if the individual had no response in 2004) on age, sex, job contract (temporary/permanent), body mass index (BMI, < 25 kg/m2 = not overweight, > 25 = overweight), high-risk alcohol consumption (> 288 g/week for men and > 192 g/week for women = “yes”, below high-risk use = “no”), current smoking (yes/no), and recommended level of physical activity (> 14 metabolic equivalent task [MET] hours/week = yes, below recommended MET = no).

4.3.4 Potential mediators

In Study III, job strain (Karasek & Theorell, 1990) and ERI (Siegrist, 1996) were considered as mediators to examine possible mechanisms to explain the association between employment in social work and work disability due to CMD. Questionnaire and item descriptions for these have been presented in previous studies (Kivimäki et al., 2007b; Laine et al., 2008). Job strain included measures of job control and job demands, and both of them were evaluated on a 5-point Likert-type scale ranging from 1 = totally agree to 5 = totally disagree. The subscale for job control included nine items (e.g., high job autonomy and decision latitude; scale 1=low to 5=high control). Job demands were measured with three items (e.g., my job requires working

very fast; scale 1=low to 5=high demands). Job strain was calculated by subtracting the mean sum score of job control from the mean sum score of job demands thus producing a measure ranging from -4 to 4. A negative score indicated low job strain (i.e., higher control than demands).

Efforts put into work were measured with one item (scale 1=low to 5=high efforts), and the subscale for rewards received from work included three items for income and job benefits, recognition and prestige, and personal satisfaction from work (scale 1=low to 5=high rewards). ERI was calculated by dividing the response for the item measuring efforts at work by the mean score of rewards at work, thus producing a measure with a range from 0.2 to 5. A higher score indicated higher ERI (i.e., high efforts relative to rewards). Both job stress measures were treated as continuous in the analyses.

In sensitivity analyses, job strain and ERI were dichotomized based on 2010–2014 medians (2010–2012 for ERI) in the longitudinal FPS for job demands (>3.4) and control (<3.777), and medians for efforts (>4.0) and rewards (<3). If both job demands and control, or both efforts and rewards indicated adverse psychosocial conditions based on the median, we specified the individuals with high job strain and ERI.

4.4 Statistical analyses

All statistical analyses were performed with SAS 9.4 Statistical Package (SAS Institute Inc, Cary, NC, USA).

4.4.1 Study I

In Study I, I calculated the cumulative days of work disability with 1) mental diagnoses and 2) somatic diagnoses per person years in 2005–2011 in Finland and 2005–2012 in Sweden in each profession. The cumulative work disability days comprised sickness absence and disability pension per calendar year. I used negative binomial regression models and estimated rate ratios (RR) and their 95% confidence intervals (CI) to examine incident work disability with mental diagnoses and somatic diagnoses. The risk of work disability was analysed among social workers in reference to preschool teachers, special education teachers and psychologists.In addition, in Study I, I calculated the duration of work disability periods, which were defined as days from the beginning of work disability to the date of RTW, granting an old-age pension (in Sweden 31st December in the year of 65th birthday), death, or end of follow-up. I calculated the hazard ratios (HR with 95% confidence intervals (CI), and used the Cox proportional hazards model to analyse the probability of RTW from work disability episodes during the study period. Using the model requires

meeting the proportionality hazards assumption. This was calculated by including the interaction of each occupation with work disability duration (Allison, 2010). In addition, I inspected the Kaplan-Meier curves to see whether the HR remained over follow-up (Allison, 2010). In the Finnish sample, the interaction was not statistically significant in any case. In the Swedish sample, all interactions were statistically significant ($p < 0.001$). However, the Kaplan-Meier curve suggested that the magnitude of the HRs remained over time, supporting the hazards assumption. In sensitivity analyses, I analysed the risk of work disability and probability of RTW with more specific diagnosis categories.

4.4.2 Study II

I conducted all analyses in Study II separately in each cohort. In all cohorts the baseline was in 2006. The end of follow-up was 2011 in Finland, 2014 in Sweden and 2016 in Denmark. I used Cox proportional hazards models to estimate the HR for medication use in social workers compared to each of the reference occupation groups separately. Reference professions were other health and social care, education and non-human service professionals. I used two outcomes for antidepressant treatment: initiation of any use and long-term us. Censoring criteria during follow-up were 1) antidepressant treatment (any treatment or long-term treatment), 2) selection out of social work (in Sweden and Denmark), 3) death or 4) end of follow-up.

First, the models were adjusted for age and sex. Then, additionally I adjusted the models for marital status (no data in Finland), area of residence, chronic somatic diseases or in- and outpatient treatment for mental disorders in 1995–2005 (in Finland only inpatient treatment; in Sweden years 2001–2005) and sickness absence benefits due to any cause in 2004–2005. After analysing all cohorts, the results for each occupational comparison were pooled with fixed effects meta-analysis (Nikolakopoulou et al., 2014). Heterogeneity was assessed with the I^2-statistic. In Denmark and Sweden, I carried out additional analyses stratified by sex, and in Finland stratified analyses were for female employees only due to a low number of cases among male employees.

4.4.3 Study III

The first step in the analysis of Study III was to investigate whether social workers and the other professionals differed regarding sociodemographic, health, and job stress at baseline. I tested group differences for dichotomous variables with a χ^2-test and for continuous variables I used a t-test. I used the Cox proportional hazards regression model to analyse the risk of work disability due to CMD across

occupations. The proportional hazards assumption was confirmed based on the Wald χ^2-test (P>0.05) and in addition I inspected the Kaplan–Meier curves to see if the HR lasted during the follow-up. The latter was also confirmed and thus I proceeded to analyse the risk of work disability due to CMD with occupation-pairs (social work versus other health and social care professionals; social work versus education professionals; social work versus non-human service work), using the Cox proportional hazards model, controlling for age, sex, job contract, BMI, alcohol risk use, smoking, and physical inactivity.

Next, mediation was analysed, and only in cases where our hypothesis about a higher job strain or ERI among social workers than among other professions was true, following guidelines of mediation analysis (Valeri & VanderWeele, 2013; VanderWeele, 2016). Also, mediation was only investigated in those comparisons where social workers had a higher risk of work disability due to common mental disorders. This requirement was made because the association between exposure and mediator, mediator and outcome, and exposure and outcome is required in mediation (Baron & Kenny, 1986; Richiardi et al., 2013; VanderWeele, 2016). The total effect (TE), however, was presented in all cases. For mediation analysis, I used counterfactual mediation analysis with survival data, calculating hazard ratios (HR) with 95% confidence intervals (CI). Counterfactual mediation analysis with survival data has been described elsewhere in detail (VanderWeele, 2011). The SAS macro presented by Valeri and VanderWeele (Valeri & VanderWeele, 2013; VanderWeele, 2016) was used to conduct the analyses. I allowed for interaction in the analyses even when the interaction was not significant, following the guidelines for counterfactual analysis (Richiardi et al., 2013).

The counterfactual mediation analysis was based on five assumptions (Valeri & VanderWeele, 2013; VanderWeele, 2011, 2016): 1) no unmeasured exposure-outcome confounding; 2) no unmeasured mediator-outcome confounding; 3) no unmeasured exposure-mediator confounding; 4) no mediator-outcome confounder affected by the exposure; and 5) temporal ordering of being employed in the profession and a self-rated level of the mediator was assumed in that order, in that the level of mediator was caused by exposure to the occupation. The effects are decomposed into controlled direct effect (CDE), NDE, NIE, and TE in the counterfactual mediation analysis. Their calculations are presented below (Valeri & VanderWeele, 2013).

First, the CDE refers to the HR for the association between employment in social work (exposure A=1) compared with employment in one of the reference occupations (A=0), and work disability due to CMD, when setting job strain/ ERI (mediator=M) to a set level (M=m) uniformly over the study population. This resembles a scenario where the effect of employment in social work is not mediated through job strain or ERI.

$$CDE=Hazard\ (A=1, M=m) / Hazard\ (A=0, M=m)$$

Second, the NDE is calculated by holding the value of the mediator in social work to the same level with the reference profession, i.e., a scenario where job strain or ERI are at a similar level to the reference profession in social work (MA=0). In the presence of no interaction between exposure and mediator, CDE and NDE are equivalent.

$$NDE=Hazard\ (A=1, MA=0) / Hazard\ (A=0, MA=0)$$

Third, the NIE refers to the excess risk of work disability due to CMD among social workers that is solely due to their higher job strain or ERI.

$$NIE=Hazard\ (A=1, MA=1) / Hazard\ (A=1, MA=0)$$

Fourth, in TE, NDE and NIE are summed up. They are considered to estimate the association between being employed in social work and work disability due to CMD. The TE represents an interpretable population average over the levels of the mediator, even in the presence of exposure-mediator interaction, and the TE estimate depends on the prevalence of the mediator in the study population (Richiardi et al., 2013).

$$TE=NDE \times NIE$$

Finally, by dissecting the NIE of social workers on risk of work disability due to CMD I was able to estimate the extent to which the excess risk of work disability among social workers would be reduced if their job strain or ERI was at the same level as in the reference occupation.

$$1 / NIE=Hazard\ (A=1, MA=0) / Hazard\ (A=1, MA=1)$$

After the main analyses, I conducted a sensitivity analyses with dichotomous job strain and ERI as mediators, by calculating the same effects with those measures.

5 Overview of the Studies

Study I

Rantonen, O., Alexanderson, K., Pentti, J., Kjeldgård, L., Hämäläinen, J., Mittendorfer-Rutz, E., Kivimäki, M., Vahtera, J., & Salo, P. Trends in work disability with mental diagnoses among social workers in Finland and Sweden in 2005–2012. Epidemiology and Psychiatric Sciences, 2017; Volume 26 (6): 644-654. https://doi.org/10.1017/S2045796016000597

Social workers report high levels of stress and have an increased risk for hospitalisation with mental diagnoses. However, it is not known whether the risk of work disability with mental diagnoses is higher among social workers compared with other human service professionals. I analysed trends in work disability (sickness absence and disability pension) with mental diagnoses and returning to work after work disability (RTW) in 2005–2012 among social workers in Finland and Sweden. The trends were compared with those of preschool teachers, special education teachers and psychologists. Records of work disability (>14 days) with mental diagnoses (ICD-10 codes F00–F99) from nationwide health registers were linked to two prospective cohort projects: the Finnish Public Sector study, years 2005–2011 and the Insurance Medicine All Sweden database, years 2005–2012. The Finnish sample comprised 4,849 employees and the Swedish 119,219 employees covering four occupations: social workers (Finland 1,155/Sweden 23,704), preschool teachers (2,419/74 785), special education teachers (832/14,004) and psychologists (443/6,726). The reference occupations were comparable regarding educational level. Risk of work disability was analysed with negative binomial regression and RTW with Cox proportional hazards. Social workers in Finland and Sweden had a higher risk of work disability with mental diagnoses compared with preschool teachers and special education teachers (rate ratio (RR) range 1.43–1.91), after adjustment for age and sex. In Sweden, but not in Finland, social workers also had higher work disability risk than psychologists (RR 1.52; 95% confidence interval 1.28–1.81). In Sweden, in the final model special education teachers had a 9% higher probability of RTW than social workers. Also, the risks for work disability with depression diagnoses and stress-related disorder diagnoses were similar to the risk with all mental diagnoses (RR range 1.40–1.77). The probability of RTW was 6%

higher in preschool teachers after work disability with depression diagnoses and 9% higher in special education teachers after work disability with stress-related disorder diagnoses compared with social workers. Social workers appeared to be at a greater risk of work disability with mental diagnoses compared with other human service professionals in Finland and Sweden. It remains to be studied whether the higher risk is due to selection of vulnerable employees to social work or the effect of work-related stress in social work. Further studies should focus on these mechanisms and the risk of work disability with mental diagnoses among human service professionals.

Study II

Rantonen, O., Alexanderson, K., Clark, A.C., Aalto, V., Sónden, A., Brønnum-Hansen, H., Hougaardd, C.Ø., Rod, N. H., Mittendorfer-Rutz, E., Kivimäki, M., Oksanen, T., & Salo, P. Antidepressant treatment among social workers, human service professionals, and non-human service professionals: A multi-cohort study in Finland, Sweden and Denmark. Journal of Affective Disorders, 2019; Volume 250(9): 153–162. https://doi.org/10.1016/j.jad.2019.03.037
Social workers have an elevated risk for mental disorders, but little is known about their antidepressant treatment. Also, it is not known whether human service professionals vary in the length of antidepressant treatment, a proxy for mental disorder severity. Finally, although societal attitudes could explain country-level variation in antidepressant use, no studies have compared antidepressant use in human service professionals between countries. I linked records from drug prescription registers to three prospective cohorts: the Finnish Public Sector study, years 2006–2011, and nation-wide cohorts in Sweden and Denmark, years 2006–2014, including a total of 1.5 million employees in (1) social work, (2) other social and health care professions, (3) education and (4) office work. I used Cox proportional hazards models to estimate hazard ratios for any and long-term (>6 months) antidepressant treatment among social workers compared to the three reference occupational groups and carried out meta-analyses. During follow-up, 25% of social workers had any prescriptions for antidepressants (19%–24% reference occupations) and 20% for long-term treatment (14%–19% reference occupations). The pooled effects for any and long-term treatment showed that probabilities were 10% higher in social workers compared to other health and social care professionals and 30% higher compared to education and non-human service professionals. Probabilities for any treatment in the three countries were relatively similar. For long-term treatment, however, the probability among social workers in Finland was greater than in Sweden and Denmark, in the comparisons with health- and social care and education professionals. Our study showed that social workers

have a higher risk for any and long-term antidepressant treatment than other human and non-human service professionals.

Study III

Rantonen, O., Ervasti J., Alexanderson, K., Mittendorfer-Rutz, E., Oksanen, T., Aalto, V. & Salo, P. Does job stress mediate the risk of work disability due to common mental disorders among social workers compared with other health and social care, education, and non-human service professionals? A prospective cohort study of public sector employees in Finland. Scand J Work Environ Health 2024;50(6):456-465. https://doi.org/10.5271/sjweh.4171.

Social workers have a higher probability of common mental disorders (CMD) than most human service professionals, but it is not clear which factors mediate this risk. The aim of this prospective cohort study was to investigate the risk of work disability (>10-day sickness absence spell or disability pension) due to common mental disorders (CMD) among social workers compared with other health and social care, education, and non-human service professionals, and whether the risk was mediated by job stress. A cohort of 16,306 public sector professionals in Finland was followed using survey data from baseline (2004 or if not available, 2008) on job stress (job strain or ERI) and register data on work disability due to CMD from baseline through 2011. Cox proportional hazards model was used to analyse the risk of work disability (hazard ratio; HR, 95% CI; confidence interval) due to CMD between three occupation-pairs in a counterfactual setting, controlling for age, sex, job contract, BMI, alcohol risk use, smoking, and physical inactivity.

Our results showed that social workers' job stress was at higher level only when compared to education professionals. Thus, mediation hypothesis was analysed comparing social workers to education professionals. Social workers had a higher risk of work disability due to CMD compared with education professionals (HR = 2.08; 95% CI 1.58–2.74). This HR was partly mediated by job strain (24%) and ERI (12%). Social workers had a higher risk of work disability than non-human service professionals (HR = 1.54; 95% CI 1.13–2.09), but not compared with other health and social care professionals. I concluded that job stress mediated the excess risk of work disability among social workers only in comparison with education professionals.

6 Discussion

The primary aim of this dissertation was to clarify whether social workers have a higher risk of CMD compared with other professions, and what might increase the risk in social work compared with other professions. This dissertation highlights that social workers are a major risk group among human service professions for work disability due to CMD and antidepressant treatment. Job strain and ERI only mediated the risk of CMD in comparison with education professionals, and only to a rather small extent. Thus, it seems that other work or employee related factors explain the increased risk. Also, it remains unclear, which factors mediate the risk in comparison with health and social care and non-human service professionals.

These findings support previous findings that have suggested a high risk of CMD in social work (e.g. Buscariolli et al., 2018; Kokkinen et al., 2019). However, previous studies have not investigated the risk of CMD with register-based data in this detail among social workers specifically compared with multiple other professions, with two different outcomes. Only few studies have included social workers as a separate reference group (e.g. Buscariolli et al., 2018; Kokkinen et al., 2019). Findings from these studies support the conclusion from the studies of this dissertation that social workers are a major risk group for mental disorders. Also, previous studies suggest that job stress could be high in social work due to several job characteristics. However, previous studies have not investigated whether a higher job stress mediates the risk of work disability due to CMD in social work compared with other professions. This dissertation provides evidence to fill those gaps in research. Future studies are needed to clarify, which factors increase the risk of CMD in social work.

6.1 Main findings

6.1.1 The risk of work disability due to mental disorders

The first hypothesis was that social workers have a higher risk of work disability due to CMD compared with other human service professions. This hypothesis was partly supported by findings from Study I and III. Social workers had a higher risk than

three human service occupations with a similar skill level in Study I, namely preschool teachers, special education teachers and psychologists. In study III, social workers had a two-fold risk of work disability due to CMD compared with education professionals and a 1.5-fold risk compared with non-human service professionals. However, social workers did not have a higher risk compared with other health and social care professionals in this study, contrary to the hypothesis. Health and social care professionals also include some professions, such as eldercare professions that likely have an equal or potentially even higher risk of CMD than social workers, which may have mitigated the risk estimate in this comparison.

Previous studies have emphasized the risk of work disability due to CMD in health and social care professions more generally, with some research also highlighting education professions (Björkenstam et al., 2021, 2022; Kokkinen et al. 2019; Leinonen et al., 2013; Lidwall et al., 2018; Samuelsson et al., 2013). One previous study showed that not only social workers, but also medical doctors, nursing and midwifery professionals, religious professionals, psychologists and preschool teachers had higher risk of sickness absence due to mental disorders compared with other occupations (Lidwall et al., 2018). In these professions, also all-cause sickness absence had a higher rate than average. In the study population of the current dissertation, the risk of work disability due to CMD was likely high in those professions as well. On the other hand, one study showed that neither medical doctors or psychologists (or service clerks) showed any statistically significant difference for the risk of mental disorders among male or female employees, when compared with other occupations with a similar skill level (Kokkinen et al., 2019). It is possible that in these professions employees have better access to treatment options, such as psychotropic treatment, or other therapeutic coping methods, compared with other professions, including social workers.

The professions above and especially low-SES health care professions (e.g. eldercare professions) in the health and social care sector may have a similar or even higher risk than social workers, based on previous studies (e.g. Madsen et al., 2012; Milner et al., 2019a). On the other hand, one study showed that social workers have the highest risk of sickness absence due to mental disorders among male employees, whereas among female employees home care employees had the highest risk, followed closely by social workers (Kokkinen et al., 2019). It is of note, that the reference groups were different than in our study. In that study, first all other professions were included as a reference group, and in the sub-group analysis all professions with a similar skill level, excluding human service professionals were included.

Although the focus of the current study was on social workers, it is important to consider what could be associated with the high risk in other health and social care professions. Health and social care professions consist of several prominent

professional groups with a low SES (e.g. eldercare professions, nursing and associate nursing professions). Human service professionals with a low SES are more likely to experience multiple psychosocial stressors in their work (e.g. lack of clarity of work roles, shift work and job insecurity) (Milner et al., 2019a). Employees with poor health are also more likely to select into professions with a low SES, such as caring and service professions, which may make them more vulnerable to adverse psychosocial working conditions (Milner et al., 2019a). Low SES in general, is a major risk factor for sickness absence (North et al., 1993; Seglem et al., 2020) and mental disorders (Karolaakso et al., 2020; Kivimäki et al., 2020; Linder et al., 2020). In these professions shift work and low work time control may also increase the risk of CMD (Albrecht et al., 2015; Torquati et al., 2019). In addition, other health and social care professions, even with a higher SES, have been associated with high job demands, which may increase the risk of CMD in these professions (Bronkhorst et al., 2015; De Sio et al., 2020; Nikunlaakso et al., 2022; Selander et al., 2022; West et al., 2016).

A higher risk of CMD is also associated with employment in the public sector, compared with employment in the private sector, and manual employment compared with non-manual employment (Björkenstam et al., 2022). This was shown in a study that investigated the risk of sickness absence due to mental disorders in young adults. Further, the highest risk was shown among those employed in health and social services. In addition, education professionals had a high risk. In the Swedish and Danish cohorts, the sample was not restricted to public sector employees, while the FPS cohort was. The analyses were not stratified between public sector employees and employees in other sectors. Also, manual and non-manual workers were not separated. It is likely that in the studies of this dissertation, manual workers in health and social care professions had a particularly high risk, based on the findings from previous studies (Björkenstam et al., 2022).

One study showed a gender-specific risk of sickness absence due to mental disorders for male human service professionals, and male social workers, compared with all other professionals. Also, the HR was higher among male social workers compared with employees in other professions with a similar skill level, than the HR in this comparison among female employees (Kokkinen et al., 2019). This is supported by previous studies with different outcomes for mental disorders (Wieclaw et al. 2006; Buscariolli et al. 2018).

Occupational culture may explain the higher risk among male employees. Male employees in female-dominated professions, such as social work may be more likely to engage in similar treatment-seeking behaviours as female employees on average. For example, in masculine occupational cultures (e.g. metal industry) male employees seem to be more inclined towards externalising behaviours than psychological coping strategies (Turtiainen & Väänänen, 2012). Finally,

occupational selection among male employees could impact the results, for example if male employees with personality traits that are associated with the risk of mental disorders are more likely to select to work in social work. Studies have shown that personality impacts the choice of occupation (Woods et al. 2010). However, to our knowledge studies have not investigated the association of personality, occupational selection and the risk of mental disorders.

6.1.2 Duration of work disability spells due to mental disorders

In the second hypothesis, I projected that social workers are less likely to RTW after long sickness absence due to CMD than other human service professionals with a similar SES (Study I). The hypothesis was based on the notion that if psychosocial conditions are more adverse in social work, this would likely lead to more severe mental health conditions and longer sickness absence spells or a higher probability of disability pension, which comprised the work disability measure combined with sickness absence. In the Swedish sample, special education teachers were more likely to RTW from work disability than social workers, but the probability was only slightly higher. In the Finnish sample, the HRs for probability of RTW were non-significant in all analysed models. Thus the findings do not support the hypothesis that social workers have longer sickness absence due to CMD than employees in other professions.

One previous study investigated the duration of RTW periods following sickness absence between occupational sectors, and showed that employees in educational and public services, commercial services and health care had the longest mean duration of absence with depressive symptoms (Koopmans et al., 2008). Future studies could investigate which factors support early RTW among social workers. It is however, likely that these are general factors that impact support RTW in professions in general. Earlier RTW has been associated with lower symptom severity, having no previous absenteeism, younger age, and positive expectations concerning sick-leave duration or RTW (de Vries et al., 2018). Other supportive factors include positive expectations of treatment and low perceived interactional justice with the supervisor (Ekberg et al., 2015).

In contrast, delayed RTW from work disability with mental diagnoses has been associated with age older than 50 years, expectation of absence duration longer than 3 months, higher educational level and diagnosis of depression or anxiety disorder, a need to reduce demands at work, and turnover intentions (Nieuwenhuijsen et al., 2006). In Study I, we adjusted the analyses for age and history of mental disorders before the beginning of the follow-up in 2004, among other factors, and thus their impact was controlled relatively well. In general, mental disorders result in longer

sickness absence spells than sickness absences with other diagnoses, which may be due to the slow recovery on average in mental disorders, recurrence of a disorder, and lack of efficient treatment and rehabilitation options in some cases (Hensing & Wahlström, 2004).

6.1.3 Risk of incident or long-term antidepressant treatment

Thirdly, I hypothesized that social workers have a higher risk of incident or long-term antidepressant treatment compared with other human service professions. This hypothesis was similar to the first one, but with a different outcome, enabling a more comprehensive understanding of the phenomenon. The meta-analysis in Study II supported this hypothesis for both incident and long-term treatment, but in country-specific analyses social workers did not have a higher risk in all comparisons, although the results were relatively similar between countries.

In Finland, the risk of incident treatment among social workers was higher only compared with education professionals. In Denmark and Sweden, the sample size was larger, which decreased the confidence intervals and social workers had a higher risk in all comparisons. The risk was the smallest compared with health and education professionals, in line with our hypotheses. In Sweden, the risks compared with education and non-human service professionals were similar, but in Denmark, the risk was highest compared with non-human service professions. This may indicate that in Denmark, these professions were less stressful, leading to a low risk of antidepressant treatment. Also other factors could explain the low risk in this reference group.

The specification of long-term treatment had little impact on the risks in the analyses in Denmark and Sweden (and the meta-analysis, which had a majority weighting from the Swedish sample). However, in the Finnish sample the risk estimates for long-term treatment were higher among social workers. For example, the risk of incident treatment was equal compared with health and social care professionals, whereas the risk of long-term treatment was 30% higher. The findings support the hypothesis that social workers have among the highest risk of antidepressant treatment, in particular in the case on long-term treatment, which is likely more indicative of depression than incident treatment (Thielen et al., 2009).

Another study in Finland showed similar results as this dissertation for incident antidepressant treatment among social workers (Buscariolli et al., 2018). In that study, specific human service professions (e.g. social workers, specific education and health professionals) were compared with non-human service professions with similar skill level, stratified by gender. The study showed that male social workers had a 2-fold risk of antidepressant treatment and female social workers had a 1.3-fold risk, compared with non-human service professionals. In Study II, the

corresponding HR for incident treatment in the FPS sample was similar among female employees. Among male employees, the sample size was low and CIs wide which limit the interpretation of the results. Similar results were shown for long-term antidepressant treatment. The results based on the samples in Denmark and Sweden, however, suggested a higher risk for male employees regarding both incident and long-term antidepressant treatment.

Similarly to the gender-specific risk of work disability due to CMD, the gender-specific risk of antidepressant treatment among male social workers may be related to working in a female-dominated sector as a gender minority, and the likelihood to engage in similar treatment-seeking behaviours for mental disorders as female employees on average. Male social workers work in a female-dominated profession, and thus they may be more likely to treat depression symptoms with antidepressant medication as an occupation-specific coping method, than their counterparts in male-dominated occupational cultures (Buscariolli et al., 2018). This could partially explain why male social workers had a pronounced risk of antidepressant treatment compared with female employees, in the comparison with non-human service professionals in Study II.

It is of note that in this dissertation, non-human service professionals included different occupational groups than were included in the study by Buscariolli *et al.* (2018). In that study, non-human service occupations included individuals with ISCO codes starting with 2, such as business, legal and engineering professionals, whereas in this dissertation I included ISCO codes 4115, that is secretaries who handle documenting, informing, HR matters and archiving, for example. Thus straightforward comparison of results is not feasible. However, Study II adds to the study by Buscariolli *et al.* (2018) with different comparisons and investigation of the risk of long-term treatment, and is in line with the results about the higher risk of mental disorders among male social workers compared with female social workers.

6.1.4 Job strain and ERI as mediators of work disability due to CMD

The fourth hypothesis was that in those comparisons where social workers have a higher risk of work disability due to CMD, the association between employment in social work and work disability due to CMD is mediated by higher job strain and ERI in social work. In Studies I and II, social workers had a higher risk compared with most of the reference groups and thus a higher risk was hypothesized in all comparisons. However, as discussed above, this requirement was not met in Study III in comparison with other health and social care professionals and thus mediation was not analysed. Also, in comparison with non-human service professionals, social workers had a lower level of job stress and thus investigating mediation was not

warranted. In that comparison, other factors, not examined in the current study, explain the higher risk.

In comparison with education professionals, job strain and ERI mediated the risk, but only to a small extent, and thus the results provided limited support to the fourth hypothesis. Instead, other work-related factors likely have a more significant role in the association between employment in social work and the risk of mental disorders. On one hand, this was unexpected, because previous studies have indicated higher job stress due to quantitative demands in social work than most other professions (Aronsson et al., 2014; Borritz et al., 2006; Madsen et al., 2010; Rugulies et al., 2009; Tham & Meagher, 2009). For example, high workload and time pressure due to high caseloads and low resources are common challenges in social work and child welfare services in particular (Mcfadden, 2015; Ravalier et al., 2020; Tham, 2007, 2018; Tham & Meagher, 2009; Travis et al., 2016). On the other hand, previous studies have suggested that qualitative demands may be more prominent job stressors in human service professions than quantitative demands (van Vegchel et al., 2004).

The finding of a slightly higher level of job stress among non-human service professionals compared with social workers was unexpected, as previous studies have highlighted high workload and ERI as key stressors in social work (Blomberg et al., 2015; Johnson et al., 2021; Mcfadden, 2015; Ravalier, 2019; Ravalier et al., 2020; Rugulies et al., 2009; Saarinen et al., 2012; Tham, 2018). However, office workers and secretaries in our sample may experience significant job stress due to factors such as time pressure, multitasking-demands from overlapping responsibilities, cognitive strain from information overload, and frequent interruptions. Lower job resources, such as limited job control from repetitive tasks and low autonomy, as well as ERI due to low pay relative to workload, could also contribute to the high levels of job strain observed in these professions (Hoven & Siegrist, 2013). Notably, in Study III, non-human service professions differed from those in another study comparing antidepressant treatment risks between human service and non-human service professions that matched employees by education and skill level (Buscariolli et al., 2018). Future studies could apply similar matching strategies when comparing human service professions with non-human service professions.

To the best of my knowledge, previous studies have not investigated job strain or ERI specifically as mediators for CMD among social workers, and few have even compared whether these are more common in social work than other professions. However, a few studies have suggested that job strain and ERI may not be important mediators in human service professions compared with non-human service professions. One study compared the risk of sickness absence among health and social care professionals compared with female employees in other professions. Adjusting for psychosocial factors attenuated the risk estimate of long-term all cause

sickness absence by 57% in comparison with employees in other professions, and the attenuation was mainly attributed to measures related to risk of threats and violence and emotional demands (Aagestad et al., 2016). Neither high job demands nor low job control accounted for a higher risk of long-term sickness absence.

Another similar study reported that ERI was higher in human service professions than non-human service professions, but the elimination of ERI (and low social support) did not attenuate the risk estimate for all-cause sickness absence among human service professionals compared with non-human service professionals (Aronsson et al., 2019). A 20% reduction in risk estimate for burnout was, however, shown. This suggests that ERI is likely associated with CMD symptoms as well, but at least in that study it did not explain the higher risk of sickness absence. Instead, high emotional demands, low work-time control, and exposure to workplace violence mediated the risk of sickness absence. The results from these studies are in line with our findings.

In sum, other stressors seem to be more important in explaining the higher risk of mental disorders among social workers. High job strain and ERI may still be common experiences in social work and this should be considered as a potential health risk. They do not seem to differentiate social work from other professions, however. Indeed, job strain and ERI were relatively similar in all groups. This also suggests that employees in the reference professions reported similarly high levels of job stress as social workers. For example, education professions have also been identified as a highly stressful occupational group (Brunsting et al., 2014; Hall-Kenyon et al., 2014; Iriarte Redín & Erro-Garcés, 2020; Madigan & Kim, 2021). Thus it was not a low-stress reference group, per se, and this impacted the effect of job stress in the comparison between social workers and education professionals. Future studies should also investigate differences in psychosocial risk factors of CMD between specific health and social care professions and social work, to investigate which factors may explain a higher risk of antidepressant treatment among social workers.

6.2 Methodological considerations

The empirical studies in this dissertation had multiple strengths. In general, the strengths of the study design in each study include large samples, long follow-up times, use of high-quality register data, low drop-out due to use of register data and high response rate in the survey used in Study III, and the use of three different register-based outcomes of CMD. The use of register data nullifies problems caused by recall bias or common-method bias (Allebeck, 2009; Gissler & Haukka, 2004). Further, using occupation as exposure was an objective measure of exposure and the ISCO codes are relatively valid for identifying employees in specific occupations.

Another strength was the novelty of the studies in this dissertation. Previous studies have not investigated the risk of CMD among social workers specifically in multiple Nordic countries, and this is to my knowledge the largest study of CMD among human service professionals in the Nordic countries. Also, previous studies have not investigated long-term antidepressant treatment among social workers compared to other human service occupations. Thus these results provide a valid comparison about occupational differences in the risk of CMD with two different types of outcomes, and about the risk of CMD among social workers in particular.

In general, the main limitations included limited comparisons between specific professions or other subgroups, general measures for job stress, lack of exposure variables related to client work to identify challenges of client work in social work, no data on pre-employment mental health history (i.e. no availability to study the selection hypothesis), validity questions with register data on CMD (i.e. antidepressants are used for other conditions than depression), a limited sample to public sector employees in the FPS sample, and differences between the cohorts in studies I and II. Also, I did not include analysis of survey drop-out and whether it differed between occupations. More detailed assessment of the strengths and weaknesses of the exposure, mediator and outcome variables and the statistical methods have been presented below.

6.2.1 Employment in social work as exposure

Employment in social work as an exposure fitted a primary aim of this dissertation, which was to clarify how social workers differ from other human service professionals in the risk of CMD. Occupation is an objective measure of exposure to job characteristics in a specific occupation and utilizing ISCO codes are highly valid way for achieving this. On the other hand, utilizing ISCO codes as a proxy-measure for job characteristics had some limitations as well.

A strength of this dissertation was the novelty of analysing social workers specifically with register data on CMD. Social workers have been identified as a risk group for decades, but to my knowledge previous studies have not investigated the risk of CMD with register data among social workers in this detail. A few studies have included social workers in occupational comparisons at the sub-group level (e.g. Buscariolli et al., 2018; Kokkinen et al. 2019; Wieclaw et al., 2006). The studies of this dissertation add to these studies with a more detailed focus on social workers. Many studies have combined diverse human service professions into a single group and typically rely on one general reference group (e.g., the general working population or non-human service professions). In contrast, this dissertation used multiple, more specific reference groups for a more nuanced analysis. On the other hand, a limitation of the wide occupational groups was that the reference categories

still included professions with heterogeneous job characteristics and exposures. Also, skill level was not controlled for in these wide reference groups, as in some previous studies (e.g. Buscariolli et al., 2018; Kokkinen et al. 2019).

In Study I, social workers were compared to three specific occupational groups regarding the risk of CMD, which in theory enabled speculating explanations for the different risks in the occupations. That is, a lower risk in one comparison could mean that the risk in the reference profession was also high, potentially due to shared risk factors. For example, in the Finnish sample, social workers had a higher risk of sickness absence due to mental disorders only compared with preschool teachers. It may be that client work demands, for example are higher among social workers, special education teachers and psychologists, in contrast to preschool teachers and thus in these comparisons social workers didn’t have a higher risk. Also, this indicates that special education teachers have a higher risk of mental disorders than preschool teachers, which could be due to adverse psychosocial conditions. However, only three reference groups were included and only tentative speculations could be made based on the results. The occupations in Study I were mostly comparable regarding educational level and within occupations, the job characteristics were likely relatively similar in both cohorts. Although the impact of SES was controlled reasonably well by not including low-SES professions, the limitation of this approach was the exclusion of multiple important reference groups with a high risk of mental disorders. This limitation was addressed in Studies II and III by including wider range of occupations.

6.2.2 Work disability due to mental disorders

Multiple measures of register data were used in this dissertation, namely work disability (sickness absence or disability pension) due to mental disorders in Studies I and III and antidepressant treatment in Study II. In Study I, RTW after work disability was also included as a secondary outcome. These measures have some individual strengths and limitations and some that are common to all of them. In general, register data has multiple strengths, such as large sample size, long follow-up times, minimal drop-out (except due to emigration or death) and absence of recall bias and common method bias (Allebeck, 2009; Furu et al., 2010; Gissler & Haukka, 2004). The national health registers in Nordic countries are of high quality in general (Allebeck, 2009; Furu et al., 2010; Gissler & Haukka, 2004) and have been shown to provide a reliable measure of mental disorders (Dewa et al., 2014; Ludvigsson et al., 2011; Melchior et al., 2009; Svedberg et al., 2010)

In Study I, the cumulative days of work disability with mental diagnoses were calculated for the main outcome measure. For comparison, cumulative work disability days were calculated for somatic diagnoses as well. Any mental diagnoses

were used due to a relatively low number of cases, because we investigated specific professions and not sectors. However, CMD constituted most of the mental disorder diagnoses in Finland (94%) and Sweden (96%) among employees with work disability during follow-up in Study I. In Study III, only CMD diagnoses were included, because CMD are more likely associated with work-related factors than other mental disorders (Goldberg & Goodyer, 2014; Nicholson, 2018; Stansfeld et al., 2016; World Health Organization, 2017).

6.2.3 Antidepressant treatment

In Study II, prescription data for antidepressant treatment was used as outcome. The strengths were minimal loss to follow up, screening for cases for each day of the follow-up, and recall or common method bias was nullified by using register data to measure depression cases. Also, by using register data for depression the validity of the measure was better than for a self-report measure, because the prescription of antidepressants was based on an assessment from a medical professional. Inclusion of two outcome measures, incident treatment and long-term treatment (>179 DDD/12 months), further enhanced the validity of the study as they reflect different aspects of mental health disorders (i.e. construct validity). A similar cut-off for long-term treatment has been used before (Madsen et al., 2014). It can also be considered as a strength that the cut-off was not based on calendar years, but rather the actual calculation of cumulative DDDs over 12-month periods throughout the follow-up. This novel way of forming the measure further increased the validity.

Despite of several important strengths, some limitations exist in using register data on antidepressant treatment. Antidepressant treatment does not necessarily correspond to all CMD cases precisely. There are at least three explanations for this: the amount of individuals with depression who are untreated is high, not all use antidepressants, because they use other treatment options such as psychotherapy and antidepressants can be prescribed for other conditions than CMD as well. (Alonso et al., 2004; Hämäläinen et al., 2009; Wittchen et al., 2011). For example, in one study, the twelve-month prevalence of depression among antidepressant users was only 30–35% and lower among short-term users (Demyttenaere et al., 2008). This likely led to an increase in false positives in the Study II, that is, some individuals were identified as depression cases, although they suffered from other conditions. Other conditions that may lead to antidepressant treatment include sleep disorders, chronic pain, and response to stressful life events (Demyttenaere et al., 2008; Trifirò et al., 2007), which however have high comorbidity with depression (Bair et al., 2003; Staner, 2010).

Low adherence decreases the validity of antidepressant treatment as a measure of mental disorders (Demyttenaere et al., 2008; Gauthier et al., 2017). One study, for

example, reported that almost 60% of patients with depressive disorders discontinue treatment within 3 months from the beginning of treatment (Rossom et al., 2016). The long-term treatment measure in Study II was thus important to more precisely identify those who more likely continued treatment after the initial prescription. More specifically, those who were specified to have long-term treatment, bought the medication up to an amount of at least 179 DDD during 12 months, and were thus likely to use the medication for depression or other conditions. However, this didn't remove the fact that depressed individuals who didn't buy antidepressants were still in the control group and not identified as cases (false negatives). These limitations point to potential misclassification of the outcome. Despite some inherent limitations of antidepressant treatment as a measure, studies suggest that it has multiple advantages (Thielen et al., 2009).

6.2.4 Misclassification with register data on mental disorders

Misclassification of the outcomes is a major issue when using register data on mental disorders, which was described by Thielen *et al.* (2009). Misclassification of the outcome occurs when individuals are incorrectly identified as having the disease when they do not, or as not having the disease when they do. Misclassification can thus be related to low sensitivity, which means a high amount of false negatives in data, or low specificity, which increases the amount of false positives in the sample (Thielen et al., 2009). Often studies assume that misclassification is non-differential, that is, similar between all exposure groups, resulting in a bias of the risk ratios or odds ratios towards the null. However, in differential misclassification, the sensitivity or specificity varies across different exposure levels, which can lead to biased results in either directions (Thielen et al., 2009). For example, when using hospital treatment for depression or antidepressant treatment as outcome, gender differences may be overestimated due to different behaviour between genders and social inequality in depression may be substantially underestimated due to differences in healthcare utilization between social groups and a higher risk of mental disorders in lower social groups, for example (Thielen et al., 2009).

When using work disability as a measure, differential misclassification could result due to occupational or gender differences in help-seeking behaviours or presenteeism (Clement et al., 2015; Turtiainen & Väänänen, 2012). Presenteeism would reduce the sensitivity of the measure, because then the individuals who do not seek medical aid or sickness absence despite being sick at work with significantly reduced work capacity, are not detected as CMD cases. Indeed, studies suggest that presenteeism may differ according to occupations and various work-related factors (Marklund et al., 2021; Solovieva et al., 2018). Thus misclassification due to presenteeism may be differential. Another possibility is misclassification due to low

specificity, which can occur due to false diagnoses. Because burnout or stressful life conditions are not medical diagnoses, they may be diagnosed as depression or anxiety, if the employee is unable to work. This would have resulted in false positives in our sample. On the other hand, the misclassification of burnout cases as CMD cases was not a major issue from the perspective of the aims in Studies I and III. That is, these cases would still have indicated psychiatric morbidity that was likely caused by work-related factors and employment in the occupations. Despite these limitations of register data, work disability data for mental disorders is in general considered a strong measure for mental disorders among employees (Hensing & Wahlström, 2004) and using such data arguably has less issues of misclassification than using antidepressant data.

The two main causes for misclassification when using register data for antidepressant treatment as outcome are related to 1) factors that influence the probability of initiating treatment (thus related to the sensitivity of the measure), and 2) the other potential indications for antidepressant treatment (thus related to the specificity of the measure). Related to the sensitivity of the measure, whether an individual initiates antidepressant treatment is linked to several determinants of health service utilization (Anderesen & Newman, 2005). These can be divided to social determinants (e.g. norms) and individual determinants (e.g. health beliefs, education, income, availability and accessibility of health services and perceived illness level). In addition, the structure and resources of the health service system impact whether the individual seeks help for their medical condition. Various factors, such as severity of the mental disorders, other chronic health conditions, living alone and previous mental health conditions increase the probability of mental health service use, whereas impeding factors for use include low social support, waiting times, costs, available professional help, and low education (Gadalla, 2008; Hämäläinen et al., 2008). The samples in this dissertation included employees only, and in Finland, the occupational health services provide relatively comprehensive services to employees, but the individual naturally still has to seek help first.

After seeking help for mental health problems, there are other factors that may increase the probability of antidepressant treatment. For example in one Finnish study, antidepressant treatment was associated with female gender, older age, being single, severity of depression diagnosis, perceived disability, and a comorbid anxiety disorder (Hämäläinen et al., 2009). In that study, social gradients such as education or income did not impact the treatments that were provided. Also, characteristics of the health care provider were associated with the probability of antidepressant treatment as the treatment plan: psychiatrists were more likely to treat depressed patients psychologically or with antidepressants, whereas primary care providers were more likely to prescribe one of either anxiolytics, hypnotics or antipsychotics for depression (Hämäläinen et al., 2009).

The main concern in this dissertation was whether there is differential misclassification due to occupation. In sum, it is possible that occupation could impact treatment seeking due to factors such as different norms, health beliefs and differences in health service coverage or insurances, but few studies have shown clear evidence for this. Studies have shown that employees in medicine and military may have a higher mental health stigma and lower likelihood of seeking help due to the social expectations related to these professions (Clement et al., 2015). Another study showed that ambulance drivers were less likely to seek treatment from a general practitioner, other physician, physiotherapist, or occupational health practitioner than employees in the general working population (Sterud et al., 2008). The study concluded that health care workers may be more reluctant to seek professional help, but it did not suggest that they were more reluctant to seek professional help for mental health problems. Such differences may be associated with a masculine occupational culture, where mental health problems seem to have a stronger stigma (Clement et al., 2015)

There are statistical techniques for handling misclassification (Thielen et al., 2011). However, I was not able to adjust for misclassification in the studies, which is a limitation. Future studies could consider the factors impacting sensitivity and specificity of work disability due to CMD or antidepressants as a measure and try to handle misclassification with statistical techniques. Based on previous studies, occupation was unlikely to cause misclassification, but it is still possible.

6.2.5 Job strain and ERI as measures of job stress in social work

The JDC and ERI models are the two most prominent stress models (Moon et al., 2024), and meta-analyses haven shown that job strain and ERI are associated with the risk of CMD (Duchaine et al., 2020; Madsen et al., 2017; Theorell, 2015; Van Der Molen et al., 2020). Also, the psychometric properties have been adequate in studies for both the job content questionnaire for measuring psychological job demands and job control (Choi et al., 2012; Karasek et al., 1998; Sale & Kerr, 2002), and the ERI questionnaire for measuring efforts and rewards at work (Montano & Peter, 2021; Siegrist et al., 2014). However, few studies focusing on human service professions have applied these measures, likely because many studies have investigated emotional demands in these professions. Thus, it is not clear whether they are valid measures of job stress in samples of human service professionals. For example, one study suggested that quantitative demands (which are part of the job strain and ERI measures) are not as important as job stressors in human service professions as qualitative demands (van Vegchel et al., 2004).

There have been some studies that have raised questions about the psychometric properties of the questionnaires. For example, some studies suggest that the psychological demands factor of the job content questionnaire may include two separate dimensions, that is 1) working fast and 2) organisational constraints on task completion due to time limitations and excessive or conflicting demands (Choi et al., 2008; Karasek et al., 1998). Also, the factor validity of the psychological demands subscale may differ according to occupation (Choi et al., 2012). Specifically, among physically-demanding occupations the scale reliability and factor validity seems to be weaker than among mentally demanding occupations. The samples in the studies of this dissertation included few physically demanding professions and thus this issue likely had little impact. In the case of the ERI questionnaire, the the role of overcommitment has been less consistent than the effort or rewards factors (Montano & Peter, 2021). However, overcommitment was not included in this study and thus it was not an issue in this dissertation.

Job strain and ERI were likely too general measures of job stress to differentiate the demand in different occupations and depict the key job demands in social work. The main concept in psychological demands for example is the high mental alertness or arousal needed to carry out tasks that require a fast pace of work with some potential organizational constraints (Karasek & Theorell, 1990), which may not represent the core of job stress experience in social work. Also, common work-related stressors in social work include time pressure and high amount of paperwork and thus psychological demands and efforts could be high in social work (Blomberg et al., 2015; Mcfadden, 2015; Ravalier, 2019; Ravalier et al., 2020; Rugulies et al., 2009; Saarinen et al., 2012; Tham, 2018). In particular, the second factor of psychological demands, that is organizational constraints and time pressure, should be a prevalent stressor with adverse health impacts in social work, because it likely leads to the experiences of constrained moral agency and consequently moral distress, which is common in social work (Mänttäri-van der Kuip, 2016, 2020). However, other job demands than psychological demands and efforts, such as client work demands, likely play a more significant role in the risk of CMD among social workers. This is in line with a previous study, which suggested that quantitative demands did not have a significant impact on well-being in human service professions, whereas qualitative demands did (van Vegchel et al., 2004).

Further, the job resources that are included in the JD-C and ERI models may not represent the kind of job resources that are lacking in social work. For example, social work is on one hand an active job that includes high autonomy (e.g. high amount of decision making, adapting different ways of working with clients) and on the other, job control may be decreased due to organizational constraints, such as time limitations and conflicting demands that are common in social work (Blomberg et al., 2015; Mänttäri-van der Kuip, 2016, 2020). The concept of constrained moral

agency illustrates an experience where institutional and organisational constraints, or individual constraints make it difficult to act according to own or professional values (Mänttäri-van der Kuip, 2020). Thus it could arguably be viewed as specific type of low job control, and it likely describes a major part of low job control in social work.

In contrast, high job control may also be a stressor in social work. For example, studies suggest that job control may have a U-shaped association with mental well-being (De Jonge & Schaufeli, 1998; Warr, 1994). Thus, high autonomy and decision latitude in social work could be stressors instead of resources. Further, increased job control buffers the negative impact of high psychological demands most effectively when social support at work is high (Johnson & Hall, 1988). For example, in social work it may be important that the employee receives support and guidance from the colleagues and the supervisor in challenging client cases in particular, because they have high responsibility over the decisions that are often challenging in these cases.

Finally, rewards at work in social work may be a conflicting measure. On one hand, social work includes aspects that can be highly rewarding. For example, social workers work with clients at vital points of their lives and have, in theory, the opportunity to make important changes that impact their clients' lives positively. This has been described through the concept of compassion satisfaction, which is a vital part of work-related rewards in social work and other helping professions (Thomas, 2013). Also, from an ethical perspective, social work can be a highly rewarding profession. For example, for social workers in Nordic countries social work is at it's core about defending the values of the Nordic welfare state and human values (Blomberg et al., 2010; International Federation of Social Workers, 2018; Kröger, 2011).

On the other hand, the experience of rewards can be low in social work due to feelings of inadequacy and not being able to perform duties according to own or professional values (Mänttäri-van der Kuip, 2014, 2016). Also, progress with social work client can be slow or a lack of progress may be common when client's problems are chronic or there are multiple problems. Such families may be dealing with multiple problems, such as neglect, alcoholism, prostitution, delinquency, substance abuse, depression and other severe mental illnesses (Sousa & Eusébio, 2007). These clients can criticize the employee due to rejection of services, insufficient support, delays in service and the heavy bureaucratic process, which can lead to conflicts and feelings of dissatisfaction among social workers regarding their competence, for being misunderstood and criticized by families, or even colleagues (Matos & Sousa, 2004). Finally, human service organizations often lack measures that tell them whether an employee has succeeded well in their work, and thus rewards are often ambiguous (Hasenfeld, 1983).

In general, JD-C and ERI models have been recognized as representative job stress models in the working population. A critique of the JD-C model could be that although the additive effect of job demands, control (and social support) on psychological well-being is clear, the multiplicative effect has been more ambiguous (Häusser et al., 2010). That is, the buffering effect of job control for high psychological demands has been inconclusive in studies. On the other hand, when specific psychological demands are matched with associated resources, interaction effects have been more consistent (Häusser et al., 2010). In the case of ERI, studies have shown strong support for the extrinsic ERI hypothesis (the association of efforts and rewards and health), but the intrinsic hypothesis has received less support (van Vegchel et al., 2005). Some studies have shown that overcommitment is associated with adverse health outcomes, but in particular there moderating effect of overcommitment between the association of effort-reward imbalance and health has received less support (Siegrist & Li, 2016).

Also, the measurement of both of these models is based on subjective appraisal, making the measurement vulnerable to self-report bias and increased risk of reversed or reciprocal causation (Häusser et al., 2010). If mental health symptoms are also measured with a self-report, the self-report bias may lead to observed effects of psychosocial work factors that are overestimated. Thus, the application of objective measures (e.g. external assessment of psychosocial conditions) has been applied in some studies (e.g. Rau et al., 2010), but in general few have followed this approach. One suggested method is the application of a job-exposure-matrix to measure job strain or ERI (Niedhammer et al., 2018). Finally, both stress models exclude other important job stressors and resources. Thus the integration of JD-C or ERI with other stress models could improve the probability that important job demands and resources in a specific profession are measured (Moon et al., 2024).

6.2.6 Residual confounding

Results are confounded when the effect of the exposure on the outcome is mixed by other factors (Howards, 2018). These may be risk or protective factors that are associated with the outcome. Unmeasured confounding can severely impact the validity of the findings when investigating a causal link between variables and thus it should be taken into account in the study design and statistical analysis (Howards, 2018). Still, addressing confounding or reporting potential unmeasured confounding is widely ignored in studies (Liang et al., 2014). In an ideal case, all confounders would be considered and what would remain would be the pure causal association in addition to potential random variations in the results (Olsen, 2011).

In theory, an idealized research scenario in the context of this dissertation would mean that the individuals employed in social work in our study would in each

comparison additionally be investigated in a parallel universe where those individuals were employed in one of the reference profession instead, but all other circumstances were the same (Howards, 2018). This would allow the identification of the causal link between employment in social work and the risk of CMD. Of course, this is not possible. In reality, confounding is challenging to control, in particular in studies that are not randomized (Olsen, 2011), as it is the case in observational research such as the current. Thus, there may be systematic differences between the individuals in the groups (e.g. individual differences among social workers vs. teachers) and if these individual factors are associated with the risk of CMD, it causes confounding.

In observational studies such as those in this dissertation, confounding can be reduced by choosing representative reference groups of non-exposed individuals for valid comparisons. In theory, the aim is to match the experience of the exposed group would have had if they were not exposed. Other ways of controlling confounding include restriction and matching. Restricting the analysis to specific levels of a certain variable, for example investigating only employees >50 years, limits the possibility of confounding for that variable, but not others. In the context of this study, matching could've been done for example, by matching the proportion of employees in different age groups to be the same between social workers and the other reference groups. In Study I, residual confounding was restricted by including occupations with a relatively similar SES, whereas low-SES professions were not included as reference groups. Also, in order to reduce confounding due to individual differences an adequate sample size was used, which increased the probability of randomization of individual differences in each study (Howards, 2018). Further, biases in data were avoided in Study III by having an adequate response rate in the questionnaire (>60 % is recommended) (Howards, 2018). In Study III, the response rates to the questionnaires were 65 and 70 percent in 2004 and 2008 respectively.

Limitations of unmeasured confounding were important in particular in Study III, because counterfactual mediation analysis includes the assumption of no unmeasured confounding. Multiple confounders were investigated in all studies and Study III in particular, where questionnaire data was available. However, it is likely that not all possible confounders were included in Study III. While discussing them in depth is outside the scope of this discussion, a few points should be made. SES was one potential confounder. SES is used to indicate the economic, social, and cultural resources that a person possesses with a more global view of status in society than using only income as am measure (Cowan et al., 2012). The recommended measure for SES among employees is a composite measure of education, occupation, and income (Cowan et al., 2012). The exposure in all current studies was occupation, and it can be argued that the within-group variation in occupation, income and education were small. Within health and social care professionals, the variation in

SES was naturally higher, because the group included professions with high and low SES (e.g. nursing professions vs. medical doctors). The differences between social workers and the reference professions in SES were small in Study I in particular, because only occupations with a relatively similar SES were included. In Studies II and III there may however have been unmeasured confounding caused by comparisons between social workers and reference groups that included low-SES professions.

The risk of mental disorders among employees may be associated with pre-employment mental disorders and thus it could be a potential confounder. For example, previous mental health conditions could have impacted the results via selection of vulnerable employees to social work in each study and a higher risk for the outcome because of that, not employment in the profession (Madsen et al., 2012; Pooler et al., 2008; West, 2015). In Study III, such confounding could have impacted the mediator (higher vulnerability to job stress instead of a higher risk due to psychosocial risk factors in the profession). In the studies of this dissertation we accounted for pre-employment mental disorders in our exclusion criteria in varying ways in the studies and for example in Study II, we used information of previous mental disorders as a covariate. Finally, a recent study showed that the association between emotional demands and depression was not accounted for by pre-employment depression or reporting bias due to such conditions (Madsen et al., 2022). Thus in Study III the association between employment in social work (and the work exposures that come with the job characteristics) and work disability due to CMD was likely not fully accounted by unmeasured pre-employment mental disorders.

Confounding can also be addressed with several strategies of statistical analysis, which are often not applied in studies (Howards, 2018). These include stratification, standardization, pooling, inverse probability weighting and modelling, all of which naturally require data on the confounder (Howards, 2018). In the Studies I and II stratification by sex was done in additional analyses, for example. This choice was based on previous findings about the higher risk of mental disorders among male social workers (Buscariolli et al., 2018). This illustrates that potential confounders can be identified from previous research in the study field. The choice of how confounders are controlled for with statistical methods is based on the characteristics of a study. For example, modelling can be used when multiple confounders are included in the analysis at the same time, whereas the other techniques, apart from inverse probability weighting, are better suited when there are a limited number of confounders that are categorical (Howards, 2018). Statistical methods to accounting for confounding should be applied in future studies when possible.

6.2.7 Statistical methods

In Study I trends of work disability during follow-up were investigated by calculating work disability days per calendar year. On one hand presenting the mean work disability days per employee was illustrative of the risk of work disability for each employee, but on the other hand the actual figures of work disability days were not presented. A strength of Study I was including analysis of RTW with survival analysis, because a higher number of mean cumulative disability days could have been due to longer work disability spells in social work. This, however received only limited support in one comparison in the Swedish sample (slightly longer RTW among social workers compared with special education teachers). Country comparisons in duration of sickness absences were not investigated with statistical analysis, but long work disability spells were clearly more common in Sweden than in Finland during the follow-up. The higher rate of work disability and longer duration of RTW may be explained by the datasets used or a more accessible and generous social security system in Sweden (OECD, 2010).

In study II and the analysis for RTW in Study I, I used survival analysis, which is a recommended framework in epidemiological studies that aim at analysing "time-to-event" data and estimating the association between an exposure and the occurrence of an outcome in a cohort after a follow-up period (Abd ElHafeez et al., 2021). Survival analysis includes multiple techniques, such as the Kaplan-Meier method and Cox regression analysis, which were both used in this dissertation. The Cox regression analysis includes the proportionality hazards assumption, indicating that the HRs remain over time during the follow-up (Abd ElHafeez et al., 2021). This was confirmed by Wald $\chi 2$-tests and visual inspection of the Kaplan–Meier curves in each study, which supported the use of cox regression analysis. Further statistical strengths of Study II were pooling the cohorts with fixed effects meta-analysis (Nikolakopoulou et al., 2014) and using sex-stratified analyses (In Finland only for female employees due to sample size). The latter was important, because the study replicated findings from another Finnish study that also showed a higher risk antidepressant treatment among male social workers compared with non-human service professionals than female social workers had in a similar comparison (Buscariolli et al., 2018).

The method of counterfactual mediation analysis in Study III had multiple advantages over traditional mediation analysis methods. Traditional mediation analysis methods do not consider potential interaction between exposure and mediator, which is an unrealistic assumption in most studies and may result in invalid inferences (Valeri & VanderWeele, 2013). The counterfactual framework that was used in Study III enabled mediation analysis in the presence of exposure–mediator interactions and nonlinearities. As part of the analysis, the total effect (TE) of the exposure and the mediator on the outcome can be decomposed into the natural direct

effect (NDE) and the natural indirect effect (NIE), which improves statistical inference (Valeri & VanderWeele, 2013; VanderWeele, 2016). In the mediation analysis I hypothesized that there was a causal association between job stress and the risk of CMD. Also, it was assumed that exposure to social work leads to higher job stress, as well as a higher risk of CMD. These assumptions were part of the counterfactual mediation analysis method, but it is not guaranteed that these assumptions were met and they were not tested.

6.3 Future directions

The findings from Study III suggest that job strain and ERI are associated with psychological well-being among social workers, but there are likely more important work-related factors that explain the higher risk among social workers compared with some of the other professions. Based on other studies, potential mediators of CMD in social work could be related to higher client work demands or moral distress, for example (Aagestad et al., 2016; Aronsson et al., 2019; van Vegchel et al., 2004). The association of such factors and the risk of CMD could be investigated in future studies, preferably with counterfactual mediation analysis.

The traditional stress models of job strain (Karasek & Theorell, 1990) and ERI (Siegrist, 1996) may not adequately measure the factors that are particularly stressful in human service professions and social work (Demerouti & Bakker, 2011; Hakanen et al., 2006; van Vegchel et al., 2004). Instead, future studies could consider other stress models or integrating elements from different models, which have been presented elsewhere in detail (Boot et al., 2024; Moon et al., 2024). One alternative theoretical model to study stress among social workers is the job demands-resources model (Demerouti et al., 2001). The model suggests that occupational well-being is impacted by 1) job demands that increase the risk of ill-health and mental disorders through chronic stress (exhaustion path), and 2) job resources that cultivate well-being and job engagement (motivation path) and buffer the impact of high demands (Demerouti & Bakker, 2011; Hakanen et al., 2006; Schaufeli, 2017). The strength of the job demands-resources model is its flexibility, because it can be used as a framework to include different types of job demands or resources that are particularly important in specific professions (Demerouti & Bakker, 2011; Hakanen et al., 2006; Schaufeli, 2017). On the other hand, the model lacks a theoretical framework for how specific factors are associated with job stress and thus, the model has been described as a conceptual model rather than a job stress theory.

Studies among human service professions have shown support for the exhaustion and motivation paths in the model, and suggest that job resources can buffer the impact of some job demands (Hakanen et al., 2006; Rugulies et al., 2007). On the other hand, one study showed that among human service professionals, job resources

such as high quality of leadership may be inadequate to buffer the impact of emotional demands on the risk of CMD (Madsen et al., 2014). Future studies could investigate which job demands are prominent in social work and which job or personal resources could buffer the impact of these demands. Studies suggest that these may be related to client work demands in particular. Based on the job demands-resources model, emotional job resources (e.g. supervision, team work practices) are likely buffers for such demands (Demerouti & Bakker, 2011).

Besides work-related factors, employee-related factors have been associated with the risk of CMD, and studies could investigate whether they increase the risk among social workers. For example, studies suggest that human service professionals are more likely to have a personal history of assuming a caretaker role in childhood than other professionals, which can lead to lower resilience to job demands, higher risk of burnout and vicarious traumatization, as well as mental disorders (Mcfadden, 2015). This could be more pronounced in some human service professions. Thus a selection of employees, who are vulnerable for mental disorders, into social work, could lead to an elevated risk of mental disorders (Madsen et al., 2012; Mcfadden, 2015; Pooler et al., 2008; West, 2015). On the other hand, few studies have investigated the selection hypothesis and thus it is not clear whether a selection of employees with vulnerability due to history of CMD is associated with an elevated risk among social workers. Also, a recent study showed that the association between emotional demands and depression was not accounted for by pre-employment depression (i.e. selection of vulnerable employees into those occupations) or reporting bias (i.e. experiencing higher emotional demands due to vulnerability to those conditions) (Madsen et al., 2022). Nevertheless, future studies should investigate the selection hypothesis among social workers.

6.4 Conclusions

This dissertation has two major implications. First, health and social care professionals and social workers in particular have an elevated risk of CMD. This was evident from the analyses of work disability due to CMD and use of antidepressant medication in Nordic countries. Second, balancing job demands and control, and the high efforts and low rewards in social work could reduce the risk of work disability due to CMD to some extent, but other factors are likely more important. The importance of identifying these factors in future studies and at workplaces can be seen as an additional implication from this dissertation. This is important in order to succeed in early prevention of mental disorders by improving the working conditions in social work.

Abbreviations

WHO	World Health Organization
CMD	Common mental disorders
JD-C	Job Demand-Control
ERI	Effort-reward imbalance
ISCO	International Standard Classification of Occupations
ICD-10	The International Classification of Diseases, 10th revision
DSM-V	The Diagnostic and Statistical Manual of Mental Disorders, 5th edition
DDD	Defined daily doses
ATC	The Anatomical Therapeutic Chemical
FPS	The Finnish Public Sector Study
IMAS	The Insurance Medicine All Sweden study
RTW	Return to work

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