

**DIAGNOSIS-SPECIFIC SICKNESS ABSENCE AND
SUBSEQUENT MENTAL HEALTH**
**- a register-linkage follow-up study among Finnish municipal
employees**

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Research report

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ABSTRACT

Background and objectives: Common mental disorders can increase the risk of sickness absence (SA), and SA has been documented to increase the risk of subsequent poorer general health and functioning, disability and severe mental problems. However, the consequences of SA to the general mental health of employees have not been studied previously. This prospective register-linkage study aimed to clarify the associations of SA with mental health among employees by examining: 1) the associations of medically certified SA due to different diagnostic causes (mental, musculoskeletal, all-cause) with subsequent common mental disorders (CMD), and 2) the associations of SA due to different diagnostic causes with the use of psychotropic medication among Finnish employees from the municipal sector.

Data and methods: The data used in the study was derived from the ongoing Helsinki Health Study (HHS). HHS baseline survey was conducted among the 40-60-year-old employees of the City of Helsinki in 2000-2002, and follow-up surveys were carried out in 2007 and 2012. Survey data were prospectively linked with national register data on diagnosis-specific SA and purchases of psychotropic medication from the Social Insurance Institution of Finland. The SA data included information on all medically certified reimbursed SA days and spells in 2004-2007 according to their diagnostic groups. The psychotropic medication data included all purchases of prescribed reimbursed medication in 2002-2009, from the ATC code categories of antidepressants N06A, and sleeping pills and sedatives N05B and N05C. Statistical analysis methods such as multivariate regression models were used to examine the associations of sickness absence with CMD (GHQ-12 questionnaire) and the medications, and the contribution of other factors such as working conditions and socioeconomic position.

Results: A higher number of SA days due to mental, musculoskeletal or any cause were all associated with subsequent CMD. SA due to mental causes was most strongly associated with later CMD, but associations were found also for SA due to musculoskeletal and all-cause SA. The associations were observed even for CMD that was reported five years after the SA follow-up ended, and they remained after adjusting for working conditions and other covariates. SA due to mental causes was associated with an increased level of psychotropic medication after the SA, and some increase was observed also for SA due to musculoskeletal causes and all-cause SA.

Conclusions: Having SA due to mental, musculoskeletal and any cause increased the risk of subsequent CMD among Finnish municipal employees. In addition, SA especially due to mental causes but also to musculoskeletal causes was associated with an increased level of psychotropic medication use. The general mental health of employees should be supported after SA to prevent further decline in mental health and to promote work ability.

1 Background

Sickness absence is a situation, or phenomenon, in which a multitude of health and work-related factors in complex and varying combinations affect the employee in ways that lead to them being absent from work. Factors such as health perceptions, health status and behaviours of the employee, job satisfaction and working conditions can have a role. (Whitaker 2001, Marmot et al. 1995, Vahtera et al.1999). A period of sickness absence does not, however, guarantee a recovery in a sense of the employee having better health post-absence but can rather increase the risk of later absences and further decline in health, functioning and work ability. (Sumanen et al. 2017) Sickness absences are a costly problem in the working life and the societies, and thus the factors preceding absence as well as the consequences of absence should be investigated in detail to provide information for necessary policies and intervening actions. (Rissanen & Kaseva 2014, Whitaker 2001)

In previous studies, sickness absence has been shown to be associated with subsequent poorer physical and mental functioning (Mänty et al. 2017), poorer self-rated health (Vahtera et al. 2010, repeated and even longer sickness absence spells Sumanen et al. 2017, Laaksonen et al. 2013, Hultin et al. 2012, Gustafsson & Marklund 2011), suicidal behaviour (Wang et al. 2014), disability retirement (Kivimäki et al. 2004, Lund et al. 2008) and premature death (Head et al. 2008, Ferrie et al. 2010, Bryngelson et al. 2013). However, the evidence on employee health after periods of sickness absence is still limited compared to the amount of information that is available on factors preceding and predicting sickness absence. Especially general mental health and common mental disorders among employees after sickness absence spells have been very little

investigated.

Mental disorders of different degrees of severity increasingly contribute to the global burden of disease, affecting the work ability of individuals and leading to an early exit from the workforce (OECD 2015, Murray et al. 2012, Järvisalo et al. 2005). Common mental disorders, which are general mental health problems such as depressive and anxiety symptoms (Goldberg 1972, Fryers et al. 2003), can affect up to 20-30% of European employees yearly (Dewa et al. 2014, Vieth 2009, Steel 2014), and lower their quality of life and psychosocial and work-related functioning, leading to a lowered work ability (Stansfeld et al. 2011, Rai et al. 2010, Lahelma et al. 2015). There is evidence from many European countries showing that common mental disorders are associated with later sickness absence (Stansfeld et al. 2011, Bertilsson et al. 2015, Gjesdal et al. 2016, Hjarsbech et al. 2011, van Hoffen et al. 2015, Roelen et al. 2013, Thorsen et al. 2013). However, very little is known about employees' general mental health, including common mental disorders, after sickness absence. Also, psychotropic medication is highly prevalent among employed populations, but its relationship with sickness absence has not been studied adequately, or at all.

This study among Finnish employees from the municipal sector aimed to examine, firstly, whether medically certified diagnosis-specific sickness absence (mental, musculoskeletal, all-cause) would be associated with subsequent common mental disorders at different time points, and secondly, what kind of changes in the level of psychotropic medication use could be seen before, during and after sickness absence due to different diagnostic causes (mental, musculoskeletal, all-cause).

2 Data and methods

Helsinki Health Study survey and register data

This study was conducted as a part of the ongoing Helsinki Health Study (HHS) which is a follow-up study of almost twenty years among the employees of the City of Helsinki. The City of Helsinki is the largest employer in Finland with a staff of about 40000, with the employees representing hundreds of occupations in mainly social and health care, education, public transportation, cultural services, environmental and technical maintenance and public administration. The HHS baseline postal survey was conducted in 2000-2002 among the employees reaching the age of 40, 45, 50 and 60 in each year (N=8960, 80% women, response rate 67%). The HHS follow-up surveys were conducted in 2007 (N=7332, response rate 83%) and 2012 2012 (N=6814, 79% responded). In this study, data from these baseline and follow-up surveys linked with national register data on diagnosis-specific sickness absence were utilised in the first sub-study. The second sub-study was based only on register data on sickness absence and psychotropic medication. Linkages of register and survey data were conducted using personal identification numbers among those with a written consent to such linkage. HHS study has been approved by ethics committees at the Department of Public Health, University of Helsinki, and at the City of Helsinki health authorities, Finland.

Diagnosis-specific sickness absence

Diagnosis-specific sickness absence information included all medically certified and reimbursed diagnosis-specific (ICD-10) and all-cause sickness absence spells lasting 14 or more consecutive calendar days during the follow-up. Sickness absence of two most

common diagnostic causes, musculoskeletal (M00-M99) and mental disorders (F00-F99) were examined along with all-cause absence which covered absences due to any diagnostic cause. In the first sub-study, the sickness absence follow-up period was from the beginning of the year 2004 until the day of receiving the respondent's follow-up survey responses in 2007. In the second sub-study, the first spell of reimbursed sickness absence in each of the diagnostic groups during 2004-2007 was selected as the sickness absence event being examined.

Mental health outcomes

Common mental disorders were measured with The General Health Questionnaire 12-item version (GHQ-12) at baseline and 2007 and 2012 follow-up surveys. GHQ-12 measures general mental health problems such as symptoms of anxiety and depression and predicts more severe mental disorders and treatment need. It is a reliable and well validated questionnaire giving a total score of 0-12, commonly dichotomized at cut-off points including 1/2, 2/3 or 3/4. In this study, the score of 0-2 indicated no disorders and was the reference category. A score of 3-12 indicated that the participant had common mental disorders.

Information on psychotropic medication purchases included all purchases of prescribed reimbursed medication and their defined daily dosages (DDDs) two years before and after as well as during the sickness absence spell that was chosen as the event to be examined in each participant. The purchases were classified according to the Anatomical Therapeutic Chemical classification system, and three groups of psychotropic medication were included: (1) antidepressants (Anatomical Therapeutic Chemical code N06A); (2) sleeping pills and sedatives (N05B and N05C); these mainly consist of benzodiazepine

derivates and are used to induce sleep and reduce irritability or agitation; and (3) any psychotropic medication (N05 and N06 except medication for dementia N06D).

Covariates

Covariates included age, marital status categorized into partnership or no partnership, and socioeconomic position measured with occupational class derived from the employer's personnel register and categorized into managers and professionals, semi-professionals, routine non-manual workers, and manual workers. Work-related covariates were based on self-reports and selected on the basis of previous analyses. Work arrangements consisted of working time of 40 hours or more per week versus less, shift work versus normal working hours, and permanent versus temporary work contract. Physical workload was measured by asking about the physical heaviness of the respondent's work with four response categories from very light to very heavy, of which the two highest were classified as high physical workload. Psychosocial working conditions included Karasek's job strain. Limiting longstanding illness (LLI) was dichotomised into those reporting any LLI and those not reporting LLI.

Statistical methods

The survey and register data were analysed with statistical methods, including calculations of prevalence, means and odds ratios with their 95% confidence intervals in logistic regression models. In the multivariate analyses of the first sub-study, the associations of the total number of sickness absence days in each diagnostic group with subsequent common mental disorders at two time points were examined by fitting age-adjusted models at first and then in a stepwise manner adjusting for other covariates, in part separately for

women and men. In the examination of psychotropic medication trends before, during, and after sickness absence, means of defined daily dosages (DDDs) in altogether eight 3-month periods, i.e. two years, before and after the sickness absence event were calculated, separately for women and men. The mean DDDs during the sickness absence event were calculated by standardising the length of the absence, which varied between individuals, to be comparable with the 3-month periods. Analyses were performed using SAS 9.4 statistical package (SAS Institute Inc, Cary, NC).

Results

Diagnosis-specific sickness absence and subsequent common mental disorders

The prevalence of having common mental disorders, i.e. self-reported GHQ-12 score of 3-12, was 25% among women and 20% among men in the year 2007, whereas 75% of women and 80% of men did not report common mental disorders in that year. The respective figure of having common mental disorders was 21% among both women men in the year 2012, whereas 19% of women and men did not have common mental disorders.

The prevalence of having at least one medically confirmed reimbursed sickness absence spell due to any cause during the sickness absence follow-up between 2004-2007 was 35% among women and 24% among men. Looking at the total number of reimbursed sickness absence days due to any diagnostic cause during the follow-up, 13% of women and 9% of men were observed to have 14-30 days, 8% of women and 6% of men had 31-60 days, and 14% of women and 9% of men had 61 or more days. The prevalence of having at least one sickness absence spell due to mental causes was 8% among women

and 5% among men. For absence due to musculoskeletal causes, the respective numbers were 14% among women and 9% among men. Prevalence percentages of common mental disorders, and especially those of common mental disorders in 2007, were in general higher among women and men with sickness absence due to any, mental or musculoskeletal causes.

Logistic regression models showed associations between sickness absence in each of the diagnostic groups and subsequent common mental disorder measured at two time points. Age-adjusted models were calculated separately for women and men, and the odds ratios (OR) are shown in Table 1. Among women, all-cause sickness absence was observed to be associated with common mental disorders, as women with a higher number of all-cause sickness absence days in 2004-7 had a higher risk of common mental disorders in both 2007 and 2012. The highest risk was observed among women with the highest total number (61+ days), of all-cause sickness absence days: their risk of having common mental disorders in 2007 was three times as high compared to women with no such sickness absence days (OR 3.08; CI 2.44-3.88) and almost twice as high in 2012 (OR=1.78; CI 1.38-2.28). Also, for sickness absence due to mental causes, a large difference was observed between women without such sickness absence and women with 14 or more days of absence, as the risk of CMD was doubled or tripled in the groups with 14+ SA days in 2007 (OR range: 1.97-3.17) and almost doubled also in 2012 (OR range: 1.86-1.97). For sickness absence due to musculoskeletal causes, women with 14-30 absence days did not have an increased risk of common mental disorders, but for women with 31+ absence days a high risk of common mental disorders was observed in both 2007 (OR range: 2.67-2.70) and 2012 (OR range: 1.91-1.98).

Among men, for all-cause sickness absence, not as clear differences according to the total

number of sickness absence days were observed as among women. Men with 14-30 all-cause absence days had, however, a statistically significant higher risk of common mental disorders in 2007 (OR: 2.07; CI 1.10-3.89), as did also men with 61+ absence days (OR:3.90; CI 2.21-6.87). The association did not remain in 2012. For sickness absence due to mental causes and musculoskeletal causes, higher OR's were observed for men with a higher number of absence days, but because the number of men was small in these groups, the confidence intervals were wide and many of the differences in the risk of common mental disorders did not reach statistical significance. Therefore, the further models adjusting for work-related and other covariates, were calculated for a pooled data of women and men. Also, sex interactions were tested, and they were not statistically significant. The adjustments for prior common mental disorders (in 2000-2), marital status, and work-related factors had some attenuating effects, but the main associations between sickness absence and common mental disorders remained (data not shown).

Table 1. Associations of diagnosis-specific sickness absence (SA) and subsequent common mental disorders (CMD, GHQ-12 score 3+), odds ratios (OR, 95% CI) adjusted for age, women and men.

SA by diagnostic causes, Total number of days in 2004-2007	WOMEN (N=2904)		MEN (N=656)	
	CMD, OR (95% CI)	CMD, OR (95% CI)	CMD, OR (95% CI)	CMD, OR (95% CI)
	2007	2012	2007	2012
All-cause SA days				
0-13	1.00	1.00	1.00	1.00
14-30	1.40 (1.08-1.81)	1.30 (1.00-1.71)	2.07 (1.10-3.89)	0.99 (0.50-1.97)
31-60	1.82 (1.36-2.44)	1.60 (1.18-2.17)	1.89 (0.90-3.93)	1.07 (0.49-2.35)
61+	3.08 (2.44-3.88)	1.78 (1.38-2.28)	3.90 (2.21-6.87)	0.94 (0.48-1.86)
Mental causes SA days				
0-13	1.00	1.00	1.00	1.00
14-30	2.35 (1.59-3.47)	1.96 (1.30-2.94)	4.21 (1.03-17.18)	0.52 (0.06-4.32)
31-60	1.97 (1.05-3.70)	1.86 (0.97-3.57)	3.34 (0.88-12.68)	1.79 (0.43-7.42)
61+	3.17 (1.97-5.08)	1.97 (1.20-3.26)	2.02 (0.68-6.06)	1.68 (0.56-5.05)
Musculoskeletal causes SA days				
0-13	1.00	1.00	1.00	1.00
14-30	1.14 (0.78-1.66)	1.08 (0.73-1.62)	1.99 (0.84-4.72)	1.46 (0.59-3.61)
31-60	2.67 (1.75-4.07)	1.98 (1.26-3.10)	3.84 (1.15-12.89)	2.63 (0.73-9.45)
61+	2.70 (1.93-3.77)	1.91 (1.34-2.74)	4.83 (1.99-11.72)	0.66 (0.19-2.30)

Psychotropic medication before, during and after diagnosis-specific sickness absence

Of all participants, 9% of women and 6% of men had at least one reimbursed sickness absence spell during the follow up due to mental causes, 9% of women and 6% of men had a sickness absence spell due to musculoskeletal causes, and 28% of women and 21% of men had a sickness absence spell due to any diagnostic cause. Psychotropic medications were purchased by 93-94% of women and 96% of men in the two years before sickness absence due to mental causes, and 94-95% of women and 96-97% of men after the absence. Before and after sickness absence due to musculoskeletal causes, psychotropic medications were purchased by 92-93% of women and 94-95% of men (before), and 93% of women and 95% of men (after). The respective figures were 43-77% among women and 81-82% among men before, and 78% among women and 83% among men after all-cause sickness absence.

The calculations for mean defined daily doses (DDDs) in the 2 years divided into 3-month periods before and after the sickness absence as well as during the absence in each diagnostic group were used to form graphs that are shown in Figures 1-3. In Figure 1, psychotropic medication in relation to sickness absence due to mental causes is shown for women and men. Among women, in the first i.e. most distant pre-event period, the mean DDD of psychotropic medication was 31, and it increased steadily over the following seven periods until the sickness absence event, with the mean DDD being over 1,5 times higher just before the event compared to the beginning of the observation. During the sickness absence, the mean DDD increased to be over four times as high as just before the absence event. To increase comparability, the mean DDD during the absence period, which was variable in length, was standardised to resemble that of a period of three

months. After sickness absence, the mean DDD decreased, but still remained higher than before the event, at 70. A gradual decrease followed during the next two years but the mean DDD still remained higher even in the last period, at 55, compared to before absence. Among men, the mean level was at approximately the same level than among women at first, but it increased somewhat more during the 2 years. Just before the sickness absence event the mean DDD among men was 54, and it peaked at 218 during the event. After the event the mean DDD decreased as also among women but remained somewhat higher for the whole 2 years of observation.

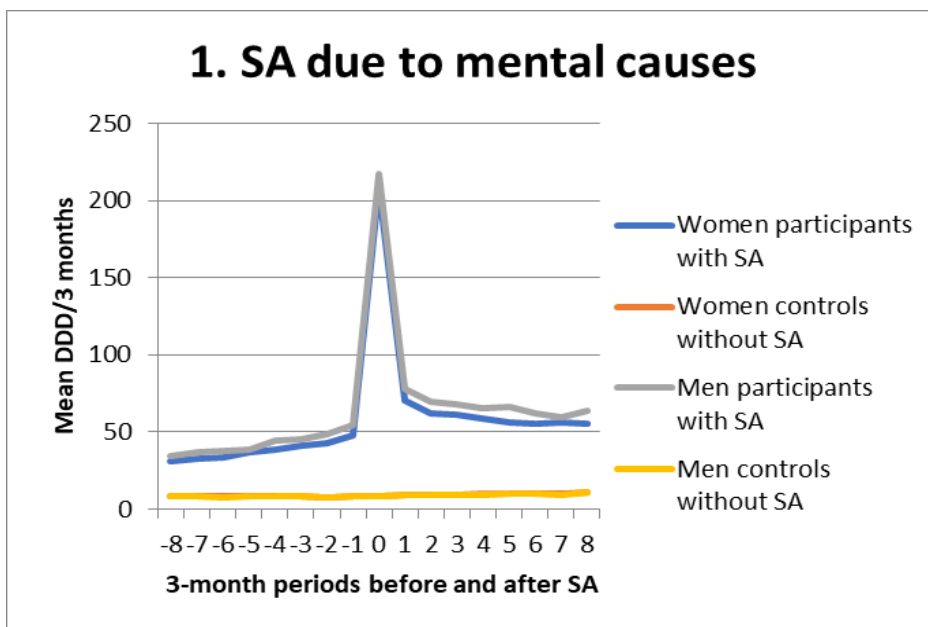


Figure 1. Psychotropic medication before, during and after sickness absence (SA) due to mental causes. Mean DDD / 3-month periods, in women and men with SA and in controls without SA.

In Figure 2, psychotropic medication in relation to sickness absence due to musculoskeletal causes is shown for women and men. Among women, the mean DDD of psychotropic medication was 13 in the first period, lower than that observed for absence due to mental causes. The mean DDD increased only slightly during the two years until the absence but increased sharply, to 34, during the absence. After sickness absence, the mean DDD decreased, but still remained a little higher than before the absence event, and

slightly increased toward the end of the 2-year observation period. Among men, a similar pattern was observed but with a slightly lower level of mean DDD throughout the study period. The mean DDD increased a little before sickness absence, was over twice as high during the absence compared to just before, dropped after the event but slightly increased again during the following two years.

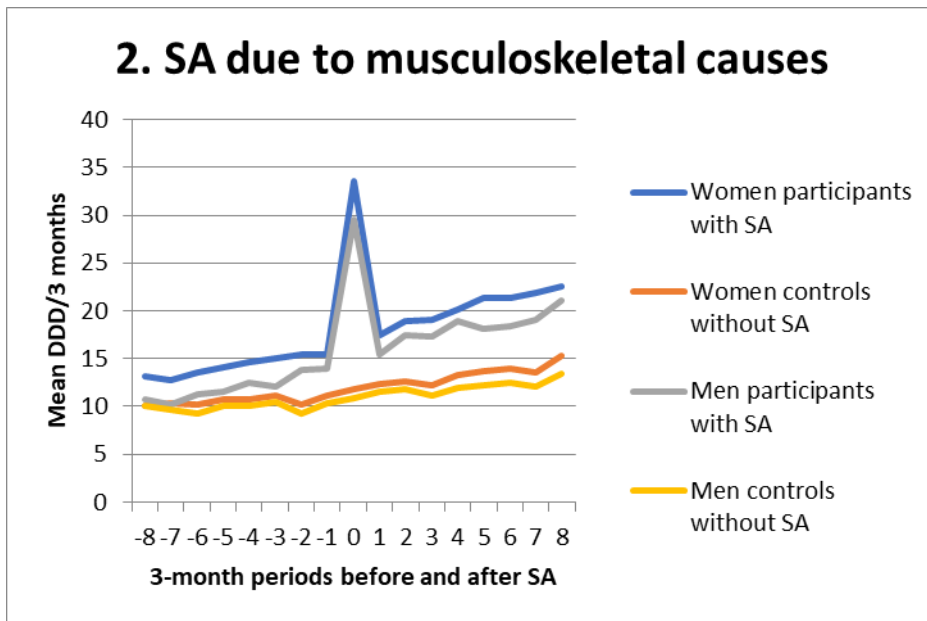


Figure 2. Psychotropic medication before, during and after sickness absence (SA) due to musculoskeletal causes. Mean DDD / 3-month periods, in women and men with SA and in controls without SA.

In Figure 3, psychotropic medication in relation to all-cause sickness absence is shown for women and men. Among women, the mean DDD of psychotropic medication was 17 in the first period, lower than before absence due to mental causes and slightly higher than before absence due to musculoskeletal causes. There was a slight gradual increase in the mean DDD during the two years until the all-cause sickness absence event, to 23, and a sharp rise to 97 during the event. After the event, the mean DDD dropped to 30 and remained at an almost similar level during the two years post-absence. Among men, the mean DDD levels before, during and after the all-cause sickness absence event were very similar to those observed for women.

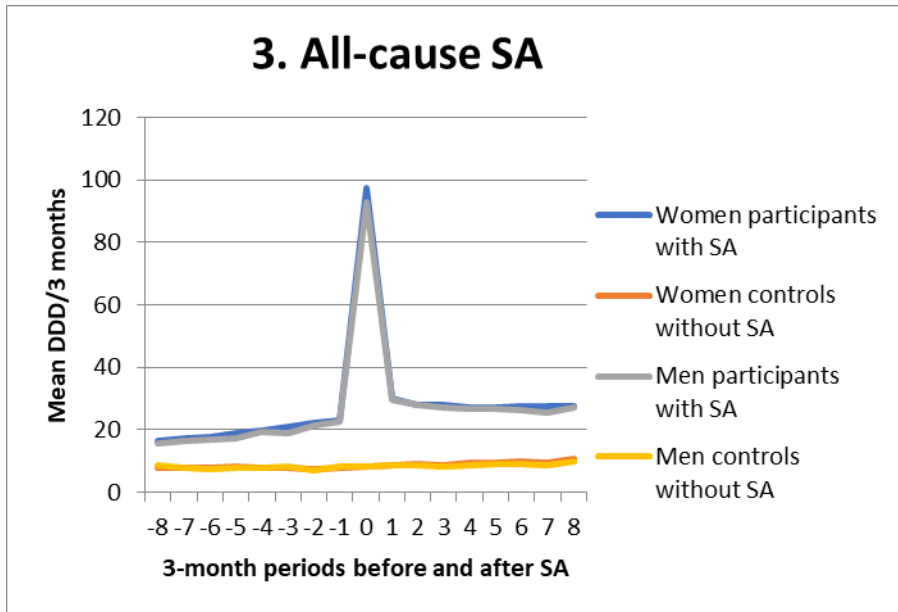


Figure 3. Psychotropic medication before, during and after all-cause sickness absence (SA). Mean DDD / 3-month periods, in women and men with SA and in controls without SA.

Conclusions

This study examined the general mental health of Finnish municipal employees after medically confirmed sickness absence due to different diagnostic causes. This study is the first to investigate the associations of diagnosis-specific, i.e. mental, musculoskeletal and all-cause, sickness absence with subsequent common mental disorders (GHQ-12) measured at two time points, and the changes in psychotropic medication before and after sickness absence. The study population in the first sub-study with linked survey and register data consisted of middle-aged and ageing women and men employed by the City of Helsinki. The study population in the second sub-study consisted of all women and men who were employed by the City of Helsinki during the study period. The main results from the first sub-study were that 1) sickness absence due to mental disorders, musculoskeletal disease as well as all-cause absence were associated with having common mental

disorders after the absence, and 2) that stronger associations were observed for more proximal subsequent common mental disorders but associations were found also for common mental disorders that were reported five or more years after the sickness absence. The associations were observed among both women and men, and they remained after controlling for sociodemographic, socioeconomic and work-related covariates and prior common mental disorders. The main results from the second sub-study were that 1) psychotropic medication increased before the sickness absence, especially before absence due to mental causes, peaked during the absence regardless of the diagnostic group, and remained higher after the absence compared to the level before the absence, and that 2) no clear differences were found between women and men.

The results of this study highlight the importance of prevention and intervention related to the mental health of employees and work ability in terms of sickness absence. Firstly, sickness absence, common mental disorders and psychotropic medication use are all very prevalent and frequent among employees and seem to be interrelated. Sickness absence may increase the risk of poorer mental health even years after absence. Thus, it would be important to focus on developing efficient measures and policies to promote employee health and wellbeing in the long-term, and to target especially those employees who have long absences from work. This should be the interest of employers as well as policy makers. There are different kinds of interventions that have been developed and could be applied in the working places both for preventing mental health issues among employees and to prevent sickness absence and support return to work after sickness absence due to different diagnostic causes (Arends et al. 2013, Bergström et al. 2017, Cullen et al. 2018, Joyce et al. 2016). Results from intervention studies need to be put into practice, and also new cost-effective ways to support employee health and work ability should be developed to suit different kinds of employee groups and working environments. Also in future

research, attention should be paid on the consequences of sickness absence and health after returning to work.

Secondly, the results of this study showed that sickness absence due to both mental and somatic causes was related to poorer mental health measured by common mental disorders and psychotropic medication. Thus, these results indicate, and confirm previous results on the subject, that the mental and physical domains of health are interrelated which should be considered in future research on work ability, and also in aspirations to prevent decline in the work ability of employees. It is likely, that there is comorbidity of mental disorders and musculoskeletal and other somatic diseases. There are probably complex mechanisms and processes which take place between mental and physical health before and after diagnosis-specific sickness absence and possible more severe work disability. Further studies are warranted concerning this comorbidity and its relations with work ability and work disability both in terms of sickness absence and other measures.

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