Recovery and recurrence of mental sickness absence among production and office workers in the industrial sector

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Background: Manual workers in the public sector have previously been found to be at risk of mental sickness absence (SA). As the impact of mental illness differs across economic sectors, this study investigated mental SA in the industrial sector, differentiating between office and production workers. Methods: Ten-year observational cohort study including 14369 (8164 production and 6205 office) workers with a total of 101118 person years. SA data were retrieved from an occupational health register. Mental SA episodes were medically certified as emotional disturbances [10th version of the International Classification of Diseases (ICD-10 F40–F99)] or mental and behavioural disorders (ICD-10 F00–F99). The first mental SA episode since baseline was called index mental SA. Recurrences were defined as any mental SA episode occurring >28 days after recovery from index mental SA. Results: The incidence of mental SA was higher in production workers than in office workers, but office workers needed longer time to recover from mental SA. Mental SA recurred as frequently in production workers as in office workers. The median time to recurrence was 15.9 months and tangibly shorter in office workers (14.9 months) than in production workers (16.7 months). Production and office workers aged ≥55 years were at increased risk of recurrent mental SA within 12 months of recovery from index mental SA. Conclusions: The incidence of mental SA was higher in production workers than in office workers, whereas recurrence rates did not differ between them. Occupational health providers should pay special attention to older workers as they are at increased risk of recurrent mental SA.

Introduction

Mental disorders are common in the general population and a major cause of sickness absence (SA) and disability pensioning. Neurotic disorders and mood disorders are a greater burden to SA and disability benefits than specific psychiatric disorders such as schizophrenia and personality disorders. In the Netherlands, emotional, neurotic and mood disorders are the most common causes of mental SA. Of Dutch workers with emotional disorders, 95% were found to have returned to work within 1 year of reporting sickness as compared with 89% of workers with neurotic disorders and 70% of workers with mood disorders. In the Finnish public sector, workers sick listed with adjustment disorders were most likely to resume work: 93% of them returned to work within 1 year of reporting sickness, followed by anxiety disorders (76%) and mood disorders (63%). Workers of high socio-economic position (SEP) were more likely to return to work than low SEP workers. High SEP workers may receive better treatment, experience more social support and have more possibilities to accommodate work to their condition. In addition, comorbid physical and mental disorders, which are associated with longer SA duration, are less common among high SEP workers.

Although knowledge about return to work after mental SA is increasing, little is known about the recurrence of mental SA. Koopmans et al. reported that after a first mental SA episode, workers had a three times higher risk of mental SA than the working population. Mental SA recurrence rates did not differ between women and men. Women <45 years of age had a higher risk of recurrent mental SA than women aged ≥45 years, while no age differences were observed in men. Mental SA recurrences were most frequent in the lowest income categories in both genders. Virtanen et al. reported that manual workers (e.g., cleaners and maintenance) had a 25% higher risk and lower-grade non-manual workers (e.g., technicians and nurses) had a 15% higher risk of recurrent mental SA as compared with upper-grade non-manual workers (e.g., teachers and physicians). These results indicate that not only the incidence and recovery, but also recurrences of mental SA may differ between occupations. Virtanen et al. suggested further research to assess the generalizability of these findings. Their sample comprised public sector workers and the impact of mental illness on SA differs across economic sectors. Public sector workers with mental illness are 28% more likely to be off work sick than private sector workers with mental illness. There is still a gap in our knowledge of recurrent mental SA, particularly in the private sector. The objective of this study was to investigate the incidence, recovery and recurrence of mental SA in private sector workers.

Methods

Study population

Data of all 15461 workers who were employed at a steel company in the period from January 2000 to December 2009 were retrieved from an occupational health service (OHS) register. For workers who were employed at the steel company, baseline was set on 1 January 2000. For those who started working at the steel company after January 2000, baseline was set on the date they entered
employment. A total of 4857 workers left the company during the 10-year study period; their data were censored when their employment ended.

Of all 15,461 workers, 53% were production workers (e.g., steel workers, process operators and maintenance technicians) and 40% were office workers (e.g., administrators, technologists and managers); data on occupation were missing for 1092 (7%) workers. As we wanted to compare production workers with office workers, the 14,369 workers whose occupation was known were eligible for analysis. They were followed for a mean (standard deviation) period of 6.9 (3.6) years, amounting to a total of 101,118 person years at the end of the 10-year study period. The Medical Ethics Committee of the University Medical Center Groningen granted ethical clearance for this register-based study.

Mental SA

In the Netherlands, SA is defined as a financially compensated temporary leave from work due to work-related and non–work-related injuries and illness. SA is employer compensated provided that it is medically certified by an occupational physician (OP) within 3 weeks of reporting sick. OPs certify SA with a diagnostic code derived from the 10th version of the International Classification of Diseases (ICD-10).13 SA episodes lasting ≥3 weeks and OP certified as due to emotional disturbance (ICD-10 R45) or mental and behavioural disorder (ICD-10 F00–F99) were defined as mental SA.2 The first mental SA episode since baseline was called index mental SA. In line with Dutch SA insurance policies, recurrent mental SA was defined as any mental SA episode occurring >28 days after recovery from index mental SA.

Statistics

The incidence density (ID) was calculated by dividing the number of index mental SA episodes by the person years at risk. Differences between production and office workers were investigated by calculating the ID ratio, that is, IDoffice workers/IDproduction workers. The time to recovery from index mental SA in production and office workers was analysed by Cox regression analysis, controlling for baseline age (<25, 25–35, 36–45, 46–55 and >55 years), gender (men, women), marital status (single, married) and employment [part time (<36 hours/week) or full time (≥36 hours/week)]. After index mental SA, the recurrence density (RD) was calculated by dividing the number of recurrent mental SA episodes by the person years at risk of recurrence. Differences between production and office workers were investigated by calculating the RD ratio, that is, RDoffice workers/RDproduction workers. ID and RD ratios were considered significant if the value 1 was not within the 95% confidence interval (CI).

The time to recurrent mental SA in production and office workers was analysed by Cox regression analysis, and stratified by age, gender, marital status and employment at baseline. All statistical analyses were performed in IBM SPSS Statistics for Windows (version 20.0).

Results

The study population included 14,369 (8164 production and 6205 office) workers, whose baseline characteristics are shown in Table 1. There were more men and full timers among production workers than among office workers. Age and marital status did not differ significantly between production and office workers (Table 1).

Index mental SA

A total of 1314 workers (ID = 13.0, 95% CI 12.3–13.7 per 1000 person years) had at least one mental SA episode in the 10-year observation period: 647 (49%) workers were diagnosed with emotional disturbances (ICD-10 R45), 85 (6%) with mood disorders (ICD-10 F30–39) and 536 (41%) with neurotic disorders (ICD-10 F40–49); the remaining 46 workers had index mental SA diagnosed within other ICD-10 F categories. Index mental SA was less common in office workers (ID = 10.2, 95% CI 9.3–11.2 per 1000 person years) than in production workers (ID = 14.9, 95% CI 13.9–15.8 per 1000 person years), with a significant ID ratio of 0.69 (95% CI 0.61–0.77). SA due to emotional disturbances and neurotic disorders was more frequent among production workers, but the time to recovery from these types of mental SA was longer among office workers (Table 2). After adjustment for age, gender, marital status and employment, the time to recovery from SA due to emotional disturbances [hazard ratio (HR) = 0.82, 95% CI 0.68–0.99] and neurotic disorders (HR = 0.80, 95% CI 0.71–0.90) remained longer in office workers as compared with production workers.

Recurrent mental SA

Of the 1314 workers with index mental SA, 375 (273 production and 102 office) workers had recurrent mental SA (RD = 34.1, 95% CI 30.6–37.5 per 1000 person years); 257 (69%) had one recurrence, 78 (21%) two recurrences, 25 (7%) three recurrences and 15 (4%) four or more recurrences during the 10-year observation period. Thirty percent of workers with recurrent mental SA experienced the recurrence within 6 months of recovery from index mental SA, cumulating to 42% within 12 months, 54% within 18 months, 64% within 24 months and 76% within 36 months.

The overall recurrence rate of mental SA did not differ significantly between office and production workers (RD ratio 0.96, 95% CI 0.87–1.06), but SA due to emotional disturbances recurred more often in production workers than in office workers (Table 2). The median time to recurrent mental SA was 15.9 (95% CI 10.1–17.9) months. The time to onset of recurrent mental SA was shorter in office workers (14.9, 95% CI 9.9–17.5 months) than in production workers (16.7, 95% CI 11.9–19.8 months), although the difference was not statistically significant (HR = 1.03, 95% CI 0.78–1.35). The median time to recurrent SA was 9.5, 11.9 and 17.3 months after index mental SA due to mood disorders, emotional disturbance and neurotic disorders, respectively (Table 3).

In both production and office workers, the time to recurrent mental SA was shortest for workers aged >55 years (Table 4). Ninety-one percent of them experienced recurrent mental SA within 12 months of index mental SA. The median time to recurrence in workers >55 years was 3.7 (95% CI 2.5–4.9) months.
and control over the production process restricted, which may explain production work, job demands in terms of work pace can be high sector workers in Finland. This finding supports that mental illness Index SA 14.9 (13.9–15.8) 10.2 (9.3–11.2) 0.69 (0.61–0.77)** 74 (13–135) 90 (46–134) 0.84 (0.56–1.15)

Notes: The table shows the incidence of (recurrent) mental SA in production and office workers, the median and 95% CI time to recovery from mental SA and unadjusted HR of Cox regression analysis of the time to recovery.

Office workers relative to production workers; ratio <1 indicates that production workers have a higher incidence than office workers.

b: Office workers relative to production workers; HR <1 indicates that office workers have longer duration mental SA than production workers.

*P < 0.05; **P < 0.01.

Recurrent mental SA

<table>
<thead>
<tr>
<th>Index mental SA</th>
<th>Production workers</th>
<th>Office workers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(N = 273)</td>
<td>(N = 102)</td>
<td>(N = 375)</td>
</tr>
<tr>
<td>Emotional disturbance (R45)</td>
<td>11.3 (7.7–14.9)</td>
<td>12.7 (2.1–23.2)</td>
<td>11.9 (5.5–17.5)</td>
</tr>
<tr>
<td>Mood disorders (F30–39)</td>
<td>10.0 (1.0–28.8)</td>
<td>7.5 (1.0–19.2)</td>
<td>9.5 (1.0–14.4)</td>
</tr>
<tr>
<td>Neurotic disorders (F40–49)</td>
<td>18.7 (11.6–25.8)</td>
<td>13.8 (9.6–17.9)</td>
<td>17.3 (13.3–23.3)</td>
</tr>
</tbody>
</table>

Notes: The table shows median (95% CI) time to onset of any mental SA in months following index mental SA.

Gender, marital status and employment did not significantly affect the time to onset of recurrent mental SA.

Discussion

In this 10-year observational study, 1314 of 14 369 workers employed in the private industrial sector had at least one episode of SA due to mental disorders. In line with previous research, mental SA was more common in production workers, but office workers needed a longer time to recover from mental SA. This study confirmed that the risk of mental SA increased after index mental SA.6,9,10 In addition, we showed that recurrence rates of mental SA did not differ between production and office workers. Workers aged >55 years were at increased risk of early onset recurrent mental SA.

Incidence of mental SA

The incidence of mental SA in this study of private sector industrial workers was lower than that reported by Virtanen et al.6 for public sector workers in Finland. This finding supports that mental illness has greater impact on public sector workers than private sector workers.11 The current results confirm that the risk of mental SA in production workers was higher than in office workers. Hence, the previously reported higher incidence of mental SA among manual workers as compared with upper-grade non-manual workers in the public sector also seems to apply to the private sector. A meta-analysis of the literature provided robust evidence that high job demands and low decision latitude as well as combinations of high efforts and low rewards are risk factors for common mental disorders.14,15 In production work, job demands in terms of work pace can be high and control over the production process restricted, which may explain the higher risk of mental SA among production workers. In addition, office workers may experience higher levels of self-efficacy and might employ more adequate coping strategies to buffer the impact of stressors.6,16 Part of the difference in recurrent mental SA could also be explained by juvenile-onset mental disorders, especially anxiety disorders and impulse-control disorders. Adolescents with such mental disorders are prone to school dropout, which has been associated with an excess risk of disabling neurotic disorders.17 It is interesting to note that it was particularly the incidence of mental SA due to neurotic disorders that was higher in production workers than in office workers.

Recovery from mental SA

Although the risk of mental SA is higher among production workers, office workers sick listed with emotional disturbance or neurotic disorders were longer absent from work. In the Finnish public sector, upper-grade non-manual public sector workers sick listed with reactions to severe stress or adjustment disorders returned to work later than manual workers, although the difference was not significant.6 Public sector manual workers with depressive disorders were longer absent from work than upper-grade manual workers. In contrast, we found that a median time to return to work was 189 days in production workers and 236 days in office workers with mood disorders, although the difference was not statistically significant, probably due to the low number (N = 85) of mental SA episodes certified as mood disorder. One possible explanation for the longer time to return to work may be that office workers have more complex jobs with high cognitive demands, which may be difficult to return to in case of a mental disorder.8,19

An alternative explanation might be the stigma of mental disorders.20,21 In occupational healthcare practice, we notice that managers find it difficult to return to work when they have had mental SA, possibly due to feelings of shame, reduced self-esteem, inefficacy beliefs and prestige status loss. However, we found no literature to support this empirical hypothesis.

Recurrence of mental SA

The overall risk of recurrent mental SA did not differ between production and office workers, but SA due to emotional disturbance recurred more frequently in production workers. Virtanen et al. found a higher recurrence risk of mental SA among manual workers as compared with upper-grade non-manual workers. The authors explained this finding by differences in treatment: compliance was poorer and resistance greater among manual workers.6 In addition, upper-grade manual workers more often arranged private psychotherapy instead of being referred to state-subsidised psychotherapy. In the
of mental SA to consult healthcare providers to assess the need for intervention after return to work of workers who have recovered from mental SA. We have to look for ways to monitor workers after mental SA. It should be kept in mind that the abovementioned strategic time points for preventive consultations are based on the median time to recurrent mental SA. Thus, half of the workers may develop mental SA later on, accentuating the need to pay continued attention to workers who have recovered from mental SA.25 On the other hand, consideration should be given to recruiting workers 6 months after recovery from mental SA due to mood disorders and 9 months after recovery from neurotic disorders. Workers aged >55 years were identified as high-risk group for recurrent mental SA and should be invited at shorter notice, that is, within 3 months of recovery from mental SA. Preventive consultations provide an opportunity to assess mental problems and work functioning. The OP can refer workers, if appropriate, to interventions aimed at improving mental health and work functioning to prevent recurrences of mental SA.

It is conceivable that negative cognitions and high neuroticism have been identified as psychological risk factors for recurrent depression.22 It is conceivable that negative cognitions and high neuroticism are more inconvenient for office work as compared with production work. It is interesting to note that we also found a shorter time to onset of recurrent mental SA after index SA due to mood disorders in office workers (13.8 months) than in production workers (18.7 months), although the difference was not statistically significant.

Age was a risk factor for recurrent mental SA. Both office and production workers aged >55 years were particularly at risk of recurrent mental SA. This contrasts the previous findings in Dutch postal workers, where women aged <45 years were at risk of recurrent mental SA. This contrasts the previous findings in Dutch postal workers, where women aged <45 years were at risk of recurrent mental SA.26,27 The study populations may not be comparable, as many postal workers had temporary (seasonal) employment with high job turnover rates.

Study strengths and limitations

The large cohort of 14,369 workers and the 10-year observation period are strengths of the study. As all workers were employed at the same company, differences in SA could not be attributed to organizational policies and practices.21 Although workers were employed in a wide variety of occupations, ranging from unskilled steel workers to executive managers, the study population was not a random sample and may therefore not be representative of the Dutch industrial sector.

The use of OP diagnoses for mental SA can be considered an asset of the study, because self-reported SA diagnoses may be subject to both recall bias and social desirability bias. The agreement between OPs and psychiatrists was found to be reasonable for specific mental diagnoses, although there is less agreement with regard to non-specified mental disorders.23

A limitation of the study is that the OHS register allows only one OP diagnostic code for each SA episode. Hence, information on comorbidity was not available, while Buist-Bouwman et al.24 reported that mental disorders with comorbid physical disorders result in longer periods of SA.

**Practical implications**

Recently, Arends et al.25 emphasized the importance of continued attention after return to work of workers who have been absent from work due to mental disorders. In our study population, the median time to recurrent mental SA was 9.5 months after an index episode due to mood disorders. The median time to onset of recurrent mental SA was 12.7 and 13.8 months after index mental SA due to emotional disturbances and neurotic disorders, respectively. Knowledge about the time to onset of recurrent mental SA is useful for planning preventive consultations. For example, OPs could consider to invite workers in recovery from mental SA due to mood disorders and 9 months after recovery from neurotic disorders. Workers aged >55 years were identified as high-risk group for recurrent mental SA and should be invited at shorter notice, that is, within 3 months of recovery from mental SA. Preventive consultations provide an opportunity to assess mental problems and work functioning. The OP can refer workers, if appropriate, to interventions aimed at improving mental health and work functioning to prevent recurrences of mental SA.

It should be kept in mind that the abovementioned strategic time points for preventive consultations are based on the median time to recurrent mental SA. Thus, half of the workers may develop mental SA later on, accentuating the need to pay continued attention to workers who have recovered from mental SA.25 On the other hand, we should not impose a patient role on workers who have recovered from mental SA. We have to look for ways to monitor workers after recovery from mental SA without troubling them too much. For example, healthcare providers could ask supervisors how workers perform after recovery from mental SA. Alternatively, we could consider developing digital applications that advise workers at risk of mental SA to consult healthcare providers to assess the need for further diagnosis and treatment.26,27

**Conclusion**

Mental SA is more common in production workers than in office workers employed in the industrial sector. Although recurrence rates did not differ between office and production workers, the time to

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**Table 4 Recurrent mental SA stratified by age, gender, marital status and employment**

<table>
<thead>
<tr>
<th></th>
<th>Production workers (N = 273)</th>
<th>Office workers (N = 102)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median (95% CI)</td>
<td>HR (95% CI)</td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;25</td>
<td>16.3 (9.6–23.7)</td>
<td>Reference</td>
</tr>
<tr>
<td>26–35</td>
<td>15.4 (8.6–22.1)</td>
<td>1.07 (0.77–1.69)</td>
</tr>
<tr>
<td>36–45</td>
<td>12.1 (4.0–20.2)</td>
<td>1.12 (0.83–1.65)</td>
</tr>
<tr>
<td>46–55</td>
<td>18.7 (13.5–23.9)</td>
<td>0.85 (0.65–1.31)</td>
</tr>
<tr>
<td>&gt;55</td>
<td>3.1 (2.0–4.4)</td>
<td>3.73 (1.84–5.55)**</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>16.7 (12.2–21.2)</td>
<td>NA</td>
</tr>
<tr>
<td>Women</td>
<td>NA</td>
<td>Reference</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>18.2 (11.7–24.7)</td>
<td>1.14 (0.77–1.70)</td>
</tr>
<tr>
<td>Married</td>
<td>16.2 (11.4–21.0)</td>
<td>Reference</td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part time</td>
<td>7.6 (0.0–16.7)</td>
<td>1.12 (0.46–2.75)</td>
</tr>
<tr>
<td>Full time</td>
<td>16.7 (12.5–20.9)</td>
<td>Reference</td>
</tr>
</tbody>
</table>

**Notes:** The table shows median and 95% CI of the time to onset of any mental SA in months following index mental SA and HR of Cox regression analysis; HR >1.0 indicates a shorter time to onset of recurrent mental SA as compared with the reference category and HR <1.0 indicates a longer time to onset.

a: Part-time employment corresponds to <36 work hours/week and full-time employment to ≥36 work hours/week.

b: Not analysed because there was only one female production worker with recurrent mental SA.

*P < 0.05; **P < 0.01.
onset of recurrent mental SA was tangibly shorter in office workers. Occupational healthcare providers should pay special attention to workers aged >55 years as they are at increased risk of recurrent mental SA within 12 months of recovery from mental SA.

Conflicts of interest: None declared.

Key points

- The incidence of mental sickness absence is higher in production workers than in office workers in the industrial sector.
- Mental sickness absence recurs as frequently in production workers as in office workers in the industrial sector.
- Occupational healthcare providers should pay special attention to workers aged >55 years as they are at increased risk of recurrent mental sickness absence.

References