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ORIGINAL ARTICLE

Psychosocial work characteristics and long-term sickness absence due to mental disorders

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Abstract

Background: Psychosocial work characteristics are associated with all-cause long-term sickness absence (LTSA).
Aims: This study investigated whether psychosocial work characteristics such as higher workload, faster pace of work, less variety in work, lack of performance feedback, and lack of supervisor support are prospectively associated with higher LTSA due to mental disorders.
Methods: Cohort study including 4877 workers employed in the distribution and transport sector in The Netherlands. Psychosocial work characteristics were included in a logistic regression model estimating the odds ratios (OR) and 95% confidence intervals (CI) of mental LTSA during 2-year follow-up. The ability of the regression model to discriminate between workers with and without mental LTSA was investigated with the area under the receiver operating characteristic curve (AUC).
Results: Tow thousand seven hundred and eighty-two (57%) workers were included in the analysis; 73 (3%) had mental LTSA. Feedback about one's performance (OR = 0.82; 95% CI 0.70–0.96) was associated with mental LTSA. A prediction model including psychosocial work characteristics poorly discriminated (AUC = 0.65; 95% CI 0.56–0.74) between workers with and without mental LTSA.
Conclusions: Feedback about one's performance is associated with lower rates of mental LTSA, but it is not useful to measure psychosocial work characteristics to identify workers at risk of mental LTSA.

Keywords

Absenteeism, job demands–resources model, mental disorders, mental health, ROC analysis, sick leave

History

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Introduction

About 15% of the working population in countries belonging to the Organization of Economic Cooperation and Development (OECD) experience mental health problems and another 5% suffers severe mental illness (OECD, 2014). The mental health expenditures are rising, and now represent 5–18% of the total health expenditures of OECD countries. Albeit less productive, most workers with mental health problems stay at work (OECD, 2014, 2015). They report sick when they experience difficulties in meeting the cognitive and emotional demands of work. It is estimated that the costs of sickness absence due to mental disorders are 3–4% of a country's gross national product (OECD, 2015). For people with a sickness absence from work due to a mental disorder a median duration of 99 days was reported during 2-year follow-up of Dutch workers (Roelen et al., 2012) and a median sickness absence duration of 147 days was reported during 1-year follow-up of Danish workers (Nielsen et al., 2012). Long-term sickness absence (LTSA) separates workers from the workplace and may ultimately lead to withdrawal from the labor market into states of disability or unemployment, which may further deteriorate mental health (Henderson et al., 2011).

There is a large body of evidence that psychosocial work characteristics are associated with mental health (Stansfeld & Candy, 2006). Most studies have used the Demand – Control (D-C) model as conceptual framework to investigate psychosocial work characteristics in relation to LTSA. The D-C model poses that job strain arises when psychological job demands are high and job control is low (Karasek & Theorell, 1990). However, the D-C model fails to capture the complexity of today's work environments. The Job Demands – Resources (JD-R) model goes beyond the D-C model and proposes that job strain can result from exposure to any job demands (i.e. those aspects of the job that require

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physical and/or psychological effort) and job resources (i.e. those aspects of the job that help to achieve goals and stimulate personal development), not only psychological job demands and job control (Bakker & Demerouti, 2007; Schaufeli & Taris, 2014).

Several studies have used the JD-R model as a framework for investigating the relationship between psychosocial work characteristics and LTSA. In a study of 3092 Dutch home care workers, psychosocial work characteristics were investigated measuring workers' perceptions by questionnaire. High physical, emotional, and psychological job demands, problems with planning, and unwanted intimacies or physical threatening by patients were related to long sickness absence duration (Bakker et al., 2003a). Alternatively, worker-reported skill discretion, decision authority, social support, professional development, coaching by supervisor, feedback about one's performance, and financial rewards were related to a high sickness absence frequency. In a study of 201 Dutch managers, Schaufeli et al. (2009) reported that increasing perceived workload, emotional demands, and work–home interference were associated with a longer duration of sickness absence. Decreasing social support, autonomy, opportunities to learn, and feedback about one's performance were associated with a higher frequency of sickness absence. In a Danish study among 39 408 workers employed in various occupations, workers who reported a high work pace, high quantitative demands, low influence at work, and poor leadership quality had a higher LTSA risk (Clausen et al., 2014).

The aforementioned studies investigated associations between worker-reported psychosocial work characteristics and LTSA irrespective of diagnosis. Reviews on work and mental health have provided evidence that perceived psychosocial work characteristics are associated with the onset of mental disorders (Nieuwenhuijsen et al., 2010). Given the fact that mental disorders are a major cause of LTSA and given the consequences of mental LTSA for employers (productivity loss and LTSA compensation costs) and workers (reduced labor market participation), it would be interesting to know if worker-reported psychosocial work characteristics are predictive of mental LTSA. We used the JD-R model as a theoretical framework to answer the following research questions:

(i) Which worker-reported psychosocial work characteristics are prospectively associated with mental LTSA?
(ii) Do these worker-reported psychosocial work characteristics identify workers at risk of mental LTSA?

Methods

Study population and design

In The Netherlands employers are obliged to offer a health survey to their personnel every four years. The present study used the data of 4877 workers employed in the distribution and transport sector, who participated in a health survey in November 2010. They received a mailed questionnaire measuring health-related variables and psychosocial work characteristics. For workers, participation in health surveys is voluntary; a total of 4018 (82%) non-sicklisted workers participated in the health survey and returned the questionnaire. Sickness absence data were retrieved from an occupational health register in the period between 1st January 2011 to 31st December 2012; 1236 workers had to be excluded because sickness absence data were not available ($n = 258$) or incomplete ($n = 978$). Consequently, 2782 (57%) workers were included in the analyses. The Medical Ethics Committee of the University Medical Center Groningen granted ethical clearance for this study.

Baseline variables

The health survey questionnaire asked for age (in years), gender (male, female), education (primary school and lower vocational education = low; secondary general or vocational education = middle; higher vocational and academic education = high), job type (chauffeurs and postmen = manual workers transport; post sorters = manual workers distribution; supervisor/manager; others, e.g. post collectors and weekend workers, predominantly students), duration of employment at present company (in years), duration of employment in the present job (i.e. job tenure in years), and the average number of work hours per week.

Baseline mental health was assessed with the 16-item distress scale of the Four-Dimensional Symptom Questionnaire (Terluin et al., 2006), which measures symptoms elicited by stressors or the efforts to maintain psychosocial functioning (e.g. worrying, irritability, tension, listlessness, poor concentration, sleeping problems and demoralization). Workers were asked if they experienced these symptoms in the past week, 'no' (=0), 'sometimes' (=1), 'regularly' (=2), 'often' (=2), or 'very often/constantly' (=2); item scores were summed (score range 0–32; Cronbach's $\alpha = 0.94$) so that higher scores reflected higher levels of distress.

Psychosocial work characteristics

Workload (11 items; $\alpha = 0.90$), work pace (7 items; $\alpha = 0.66$), variety in work (6 items; $\alpha = 0.86$), autonomy in work (3 items; $\alpha = 0.81$), participation in decisions about work (6 items; $\alpha = 0.91$), learning opportunities (4 items; $\alpha = 0.90$), receipt of feedback about one's performance (3 items; $\alpha = 0.87$), and support from supervisor (5 items; $\alpha = 0.94$) and co-workers (3 items; $\alpha = 0.91$) were measured with the Questionnaire on the Experience and Evaluation of Work (van Veldhoven et al. 2002). Workers could respond on a four-point frequency scale ranging from ''never'' (=1) to ''always'' (=4) and item scores were summed to scale scores, so that higher scores represented higher levels of the working condition measured. For comparability, all scale scores were expressed as percentage of the maximum scale score (range 0–100).

Changes in work were assessed with six questions about changes in work tasks (e.g. How often did the contents of your work change in the past year?), team (e.g. How often did the team staffing change in the past year?), and organization (e.g. How often did changes in organizational policies occur in the past year?). Responses were given on 5-point frequency scales ranging from ''never'' to ''often/always'' and summed ($\alpha = 0.84$) so that higher scores represented more

frequent changes. The scale score was expressed as percentage of the maximum scale score (range 0–100).

Long-term sickness absence (LTSA)

The International Classification of Functioning, Disability and Health (ICF) recognizes that disability is the result of the interaction between body functions, body structures, activities, participation and contextual demands (WHO, 2001). In line with the ICF model, we defined sickness absence as a temporary paid leave from work due to incapacity to meet the demands of work as a result of injury or illness. Sickness absence was recorded from the first to the last sickness absence day in an occupational health register. In The Netherlands, sickness absence is medically certified by an occupational physician (OP) with a diagnostic code derived from the 10th International Classification of Diseases (ICD-10) within 42 days of reporting sick. Therefore, LTSA was defined as sickness absence lasting 42 days or longer. Mental LTSA was defined as LTSA OP-certified within ICD-10 chapter F (Mental and Behavioral Disorders).

Statistical analysis

Statistical analyses were done in IBM SPSS Statistics for Windows, version 23 (released 2015; IBM Corp. Armonk, NY). First, we investigated prospective associations between each of the worker-reported psychosocial work characteristics and the occurrence (no = 0, yes = 1) of mental LTSA in the period from 1st January 2011 to 31st December 2012 by using logistic regression analyses. The associations were adjusted for sociodemographics (age, gender, and educational level), work factors (job type, duration of employment, job tenure, and work hours/week), and baseline mental health.

Then, all perceived psychosocial work characteristics were included together in a logistic regression model for mental LTSA, which was then reduced by stepwise backward selection procedure, adhering to Akaike's Information Criterion (AIC) as stopping rule (Burnham & Anderson, 2002). For the final model, we used receiver operating characteristic (ROC) analysis to investigate the ability of the reduced models to discriminate between workers with and without (mental) LTSA during 2-year follow-up. The area under the ROC-curve (AUC) was considered as measure for the discriminative ability; AUC < 0.60 represents failing, 0.60–0.69 poor, 0.70–0.79 fair, 0.80–0.89 good, and 0.90–1.00 perfect discrimination (Obuchowski, 2003). The AUC is indicative of the percentage of correctly identified workers with mental LTSA during follow-up.

For comparison, the same analyses were performed for all OP-certified LTSA episodes, excluding sick leaves due to pregnancy, childbirth and puerperium (ICD-10 chapter XV).

Results

The 1236 workers excluded from analysis because of unavailable or incomplete sickness absence data were younger, more often male, had a shorter employment duration, shorter job tenure, and reported more favorable psychosocial work characteristics than the 2782 workers included in complete cases analysis (Table 1).

Associations between perceived psychosocial work characteristics and mental LTSA

A total of 73 (3%) workers had mental LTSA during 2-year follow-up: 37 (52%) were diagnosed with anxiety, stress-related, and somatoform disorders (ICD-10 F40-49), 17 (23%) symptoms and signs of emotional disturbance (R45),14 (19%) mood disorders (F30-39), and 5 (6%) psychotic disorders (F20-29). Higher levels of perceived feedback about one's performance was associated with lower odds of mental LTSA, but associations became non-significant after adjustment for work factors and baseline mental health (Table 2). The other psychosocial work characteristics were not significantly associated with mental LTSA during 2-year follow-up.

Associations between perceived psychosocial work characteristics and all-cause LTSA

A total of 393 (14%) workers had all-cause LTSA during 2-year follow-up. Higher workload and higher work pace were associated with higher odds of all-cause LTSA, whereas more learning opportunities, more feedback about one's performance, and more support from the supervisor were associated with lower odds of all-cause LTSA (Table 3). The associations weakened after adjustment for sociodemographics, but remained significant for learning opportunities, feedback about one's performance, and supervisor support. After adjustment for work factors and baseline mental health, only feedback about one's performance was significantly associated with all-cause LTSA.

Identifying workers at risk of mental LTSA

When all worker-reported psychosocial work characteristics were included together in logistic regression analysis, learning opportunities had the highest Wald-statistic, indicating that this was the strongest predictor of mental LTSA (Table 4). In seven backward steps, participation in decisions about work, workload, support from supervisor and colleagues, autonomy, work pace, and changes in work were removed from the model. The remaining model (including variety in work, feedback about one's performance, and learning opportunities) poorly identified workers with mental LTSA during follow-up (AUC = 0.65; 95% CI 0.56–0.74).

With regard to all-cause LTSA, perceived support from supervisor and autonomy were removed from the logistic regression model. The final model (including workload, work pace, changes in work, variety in work, participation in decisions about work, learning opportunities, feedback about one's performance, and support from colleagues) did not identify workers with all-cause LTSA during follow-up (AUC = 0.59; 95% CI 0.56–0.62).

Discussion

Higher levels of worker-reported feedback about one's performance were significantly associated with a lower mental LTSA risk during 2-year follow-up of workers employed in the distribution and transport sector. Higher workload and higher work pace were associated with a higher risk of all-cause LTSA. Alternatively, more learning opportunities, more feedback about one's performance, and more

Table 1. Study population characteristics ($N = 4018$).

	Included in complete cases analyses ($n = 2782$)		Excluded because of missing data ($n = 1236$)		
	Mean (SD)[a]	*N* (%)	Mean (SD)[a]	*N* (%)	Analysis
Age (in years)	49.9 (9.5)		34.1 (14.9)		$p < 0.01$[b]
Gender					
Men		1235 (44)		609 (49)	$p < 0.01$[c]
Women		1547 (56)		627 (51)	
Educational level					
Low		1460 (52)		648 (52)	$p = 0.96$[c]
Middle		1038 (37)		459 (37)	
High		284 (11)		129 (11)	
Job type					
Manual worker transport		1046 (38)		1083 (88)	$p < 0.01$[c]
Manual worker distribution		1455 (52)		64 (5)	
Supervisor/manager		150 (5)		8 (1)	
Other		131 (5)		81 (6)	
Duration employment					
<1 year		142 (5)		130 (11)	$p = 0.01$
1–5 years		537 (19)		286 (23)	
5–10 years		275 (10)		98 (8)	
10–20 years		682 (25)		298 (24)	
>20 years		1146 (41)		424 (34)	
Job tenure (in years)	12.8 (11.4)		11.6 (10.7)		$p = 0.03$
Work hours per week	22.4 (12.2)		10.6 (7.4)		$p < 0.01$[d]
Mental health (range 0–32)	9.8 (9.0)		8.3 (8.4)		$p < 0.01$[d]
Psychosocial work characteristics (range 0–100)					
Workload	44.9 (20.4)		42.5 (19.7)		$p = 0.04$[d]
Work pace	39.6 (18.7)		38.0 (17.9)		$p = 0.16$[d]
Changes in work	32.0 (19.2)		31.6 (18.8)		$p = 0.63$[d]
Variety in work	33.2 (22.3)		37.4 (24.5)		$p < 0.01$[d]
Autonomy in work	40.1 (27.7)		44.8 (28.3)		$p < 0.01$[d]
Participation in decisions about work	24.4 (20.4)		29.4 (23.9)		$p < 0.01$[d]
Learning opportunities	15.3 (19.7)		20.8 (23.8)		$p < 0.01$[d]
Feedback about one's performance	41.0 (25.1)		47.5 (26.6)		$p < 0.01$[d]
Support from the supervisor	48.1 (27.2)		54.1 (26.7)		$p < 0.01$[d]
Support from co-workers	53.5 (26.2)		58.8 (25.1)		$p < 0.01$[d]

[a]Standard deviation.
[b]Parametric *t*-test for independent samples.
[c]Chi-square test.
[d]Non-parametric Mann–Whitney test for independent samples.

Table 2. Psychosocial work characteristics and long-term sickness absence (LTSA) due to mental disorders.

		Adjusted for		
Work characteristic	Unadjusted	Sociodemographics	Work factors	Mental health
Workload	1.08 (0.91–1.29)	1.03 (0.85–1.25)	0.98 (0.79–1.22)	0.89 (0.73–1.08)
Work pace	1.04 (0.87–1.24)	0.96 (0.81–1.15)	0.87 (0.71–1.06)	0.80 (0.66–0.98)[a]
Changes in work	1.14 (0.97–1.33)	1.11 (0.93–1.32)	1.06 (0.87–1.29)	0.97 (0.81–1.16)
Variety in work	0.97 (0.83–1.14)	0.96 (0.82–1.12)	0.99 (0.83–1.18)	1.02 (0.87–1.19)
Autonomy in work	0.89 (0.77–1.02)	0.91 (0.80–1.05)	0.96 (0.84–1.10)	0.95 (0.83–1.09)
Participation in decisions about work	0.84 (0.69–1.03)	0.88 (0.72–1.07)	0.92 (0.74–1.14)	0.91 (0.75–1.11)
Learning opportunities	0.79 (0.62–1.00)	0.83 (0.65–1.05)	0.90 (0.70–1.17)	0.84 (0.67–1.07)
Feedback about one's performance	0.82 (0.70–0.96)[b]	0.84 (0.71–0.98)[a]	0.88 (0.74–1.05)	0.89 (0.76–1.04)
Support from the supervisor	0.89 (0.77–1.02)	0.93 (0.81–1.07)	0.98 (0.85–1.12)	1.00 (0.87–1.15)
Support from co-workers	0.95 (0.83–1.09)	0.97 (0.85–1.11)	1.01 (0.88–1.16)	1.03 (0.90–1.18)

The table shows odds ratios (95% confidence intervals) per 10-point increase in standardized scores (range 0–100) for each work characteristic (unadjusted), adjusted for sociodemographics (age, gender, and educational level), work factors (job type, duration of employment, job tenure, and work hours/week), and baseline mental health.
[a]Significant at the 5% level.
[b]Significant at the 1% level.

support from the supervisor were associated with a lower risk of all-cause LTSA. Associations between psychosocial work characteristics and both mental and all-cause LTSA weakened after adjusting the analyses for work factors (job type, duration of employment, job tenure, and work hours/week) and baseline mental health. The results of the study should be interpreted with caution, because we investigated many associations and only found a weak relationship between

Table 3. Psychosocial work characteristics and all-cause long-term sickness absence (LTSA).

		Adjusted for		
Work characteristic	Unadjusted	Sociodemographics	Work factors	Mental health
Workload	1.07 (1.01–1.14)[a]	1.03 (0.95–1.11)	0.99 (0.92–1.07)	1.04 (0.98–1.10)
Work pace	1.09 (1.03–1.16)[b]	1.05 (0.99–1.11)	1.01 (0.95–1.07)	1.05 (0.99–1.11)
Changes in work	1.04 (0.98–1.10)	1.03 (0.97–1.09)	0.98 (0.91–1.06)	1.00 (0.94–1.06)
Variety in work	0.97 (0.93–1.01)	0.97 (0.92–1.03)	0.99 (0.93–1.05)	0.99 (0.93–1.05)
Autonomy in work	0.96 (0.92–1.00)	0.98 (0.94–1.02)	1.00 (0.96–1.04)	0.97 (0.92–1.03)
Participation in decisions about work	0.94 (0.89–1.00)	0.95 (0.90–1.01)	0.96 (0.91–1.02)	0.95 (0.90–1.01)
Learning opportunities	0.90 (0.84–0.95)[b]	0.91 (0.86–0.97)[b]	0.92 (0.85–1.00)	0.91 (0.86–1.00)
Feedback about one's performance	0.92 (0.89–0.96)[b]	0.90 (0.85–0.95)[b]	0.92 (0.87–0.98)[b]	0.94 (0.91–0.98)[b]
Support from the supervisor	0.94 (0.91–0.98)[b]	0.95 (0.91–0.99)[a]	0.98 (0.94–1.02)	0.96 (0.92–1.00)
Support from co-workers	0.97 (0.93–1.01)	0.98 (0.94–1.02)	1.00 (0.96–1.04)	0.99 (0.95–1.03)

The table shows odds ratios (95% confidence intervals) per 10-point increase in standardized scores (range 0–100) for each work characteristic (unadjusted), adjusted for sociodemographics (age, gender, and educational level), work factors (job type, duration of employment, job tenure, and work hours/week), and baseline mental health.
[a]Significant at the 5% level.
[b]Significant at the 1% level.

Table 4. Multivariable models of psychosocial work characteristics.

	Mental LTSA		All-cause LTSA	
Work characteristic	OR (95% CI)	Wald	OR (95% CI)	Wald
Workload	0.98 (0.75–1.29)	0.014	1.02 (0.92–1.13)	0.236
Work pace	0.90 (0.70–1.17)	0.682	1.06 (0.98–1.15)	2.166
Changes in work	1.13 (0.91–1.40)	1.301	0.98 (0.91–1.06)	0.406
Variety in work	1.15 (0.95–1.40)	2.001	1.06 (1.00–1.13)	3.008
Autonomy in work	0.91 (0.77–1.09)	1.054	1.00 (0.94–1.06)	0.009
Participation in decisions about work	1.00 (0.75–1.34)	0.001	1.03 (0.93–1.14)	0.406
Learning opportunities	0.83 (0.60–1.13)	1.509	0.88 (0.81–0.95)	8.147
Feedback about one's performance	0.86 (0.71–1.05)	2.126	0.94 (0.89–1.00)	3.078
Support from the supervisor	0.98 (0.82–1.17)	0.053	1.00 (0.94–1.06)	0.002
Support from co-workers	1.04 (0.91–1.19)	0.302	1.02 (0.96–1.08)	0.446

The table shows odds ratios (OR) and 95% confidence intervals (CI) per 10-point increase in standardized scores (range 0–100) when all work characteristics are included together in a logistic regression model for long-term sickness absence (LTSA) due to mental disorders (mental LTSA) or LTSA irrespective of diagnosis (all-cause LTSA); higher Wald statistics reflect stronger predictive ability.

feedback about one's performance and mental LTSA. Although associations were significant for some psychosocial work characteristics, the overall predictive strength of a prediction model including worker-reported psychosocial work characteristics was not great.

Perceived psychosocial work characteristics and mental LTSA

The relationship between worker-reported psychosocial work characteristics and mental LTSA was studied by using the JD-R model as a theoretical framework. We found that more feedback about one's performance was associated with a lower mental LTSA risk. Previously, Bakker et al. (2003b) have reported that more feedback about one's performance was associated with fewer mental health problems, particularly exhaustion among call center workers. In addition more feedback about one's performance was related to more work involvement and a lower turnover intention. More feedback about one's performance may increase work motivation and stimulate personal development. Furthermore, more feedback about one's performance may contribute to more work efficiency and thus facilitate reaching work goals.

It was unexpected that higher workload (e.g. does your work demand a lot of concentration, precision, attention, thought, carefulness) and work pace (e.g. do you have to hurry, work fast, work under time pressure) were not significantly related to mental LTSA. The literature on associations between psychosocial work characteristics and mental LTSA is scarce. One cross-sectional study reported that quantitative demands and role conflicts were positively correlated with mental LTSA among workers employed at a Swedish county council (Wännström et al., 2009). Our different findings may be due to differences in study population and study design. Furthermore, we measured psychosocial work characteristics with other instruments than those used by Wännström and colleagues.

The prospective associations between perceived psychosocial work characteristics and mental LTSA weakened after adjustment for baseline mental health. This is most likely due to the fact that mental health mediates between psychosocial work characteristics and mental LTSA: unfavorable work

characteristics→poor mental health→mental LTSA. However, adjustment for mental LTSA also weakened the associations between psychosocial work characteristics and all-cause LTSA. This could indicate that workers who experience poor mental health (i.e. higher distress levels) perceive work characteristics more negatively than healthy workers (De Lange et al., 2004; Hanebuth et al., 2006).

The finding that most worker-reported psychosocial work characteristics were not significantly associated with mental LTSA could also be explained by the fact that stressful events rather than unfavorable work characteristics cause mental LTSA. In that regard, it is important to acknowledge that most workers with mental LTSA were diagnosed with adjustment disorders, i.e.: difficulties adjusting to major changes created by life events at the workplace (e.g. change of work or job loss) and/or in private life (e.g. divorce, disease or death of relatives and financial problems). Maladaptive reactions to stressful life events and resulting adjustment disorders impair social and occupational functioning. In The Netherlands, workers diagnosed with adjustment disorders due to stressful events in private life are also allowed a paid leave off work due to sickness if they are unable to meet the demands of work. Sickness absence due to adjustment disorders is the major cause of mental LTSA in The Netherlands (Roelen et al., 2012).

Perceived psychosocial work characteristics and all-cause LTSA

For comparability of the present results with those of previous studies, we investigated the relationship between worker-reported psychosocial work characteristics and all-cause LTSA. In agreement with studies that used the JD-R model as theoretical framework (Bakker et al., 2003b; Clausen et al., 2014; Schaufeli et al., 2009), we found that a higher workload and higher work pace were associated with a higher risk of all-cause LTSA. The associations weakened, however, after adjustment for sociodemographics and work factors. For high work pace, Clausen et al. (2014) have shown an increased risk of all-cause LTSA among employees working with customers, but not among white and blue collar workers. Furthermore, the association between work pace and all-cause LTSA became non-significant after mutual adjustment for work factors.

We also found that higher levels of learning opportunities, feedback about one's performance, and more support from the supervisor buffered against all-cause LTSA. Previously, Clausen et al. (2014) reported strong associations between job resources, particularly influence at work and the risk of all-cause LTSA. The authors discussed the importance of job resources for adapting to and coping with the stresses and strains experienced in the work situation. For instance, it may be easier to cope with high job demands, if workers experience good relations with their supervisor and receive more feedback about how they perform their work than if workers do not harbor positive emotions towards work (Hobfoll, 2002).

The associations between perceived psychosocial work characteristics and LTSA weakened after adjustment for work factors, particularly the duration of employment and to a lesser extent job tenure [data not shown]. Obviously, the risk of LTSA depends on both the level and the duration of exposure to psychosocial work characteristics. Independent of the duration of exposure, only more feedback about one's performance was significantly associated with the risk of LTSA.

Unexpectedly, we found more psychosocial work characteristics to predict LTSA for all causes than LTSA for mental disorders. One explanation may be that the results were biased by diagnostic misclassification. O'Niell et al. (2008) reported that the agreement between OPs and psychiatrists for certifying LTSA was better for specific mental diagnoses such as depression and anxiety disorders, than for non-specific stress-related disorders. OPs may have certified sickness absence within the ICD-10 chapter XVIII of symptoms and signs not elsewhere classified if workers presented with non-specific symptoms such as headache or tiredness. Also, workers presenting with psychosomatic symptoms could have been misclassified as having a musculoskeletal or other somatic disorder. Thus, the OP-diagnoses may have been biased by non-recognition. However, using OP-diagnosed mental LTSA is better than relying on worker-reported mental illness.

The finding that more psychosocial work characteristics are associated with all-cause LTSA may also be explained from a statistical viewpoint. There were more all-cause LTSA events, and therefore estimations of regression coefficients were more precise. For example, the association of workload with mental LTSA was of the same magnitude (OR = 1.08) as the association with all-cause LTSA (OR = 1.07), but the estimate for all-cause LTSA was more precise as was reflected in a narrower 95% CI. Due to the greater statistical power, the association between workload and all-cause LTSA was significant while the association between workload and mental LTSA was not significant.

Strengths and weaknesses

The prospective study design and the use of recorded LTSA data and OP-diagnoses are strengths of the current study, but some weaknesses should be mentioned. First, the response rate was high (82%), but we had to exclude 1,236 (31%) responders because their sickness absence data were not available or incomplete. The excluded workers were younger, had shorter employment duration and job tenure, worked less hours/week, and generally reported more favorable psychosocial work characteristics than the workers included in the analyses.

Another limitation is the low number of mental LTSA episodes. The associations between psychosocial work characteristics and mental LTSA were of the same magnitude as the associations with all-cause LTSA, but the 95% confidence intervals were wider due to the low number of mental LTSA episodes.

The present study measured psychosocial work characteristics with self-administered questionnaires. Using worker-reported data is a convenient way to collect information from a large number of workers. Furthermore, workers are those who know and experience their work environment. These advantages must be balanced against one major disadvantage

that workers' responses are not only driven by the characteristics of work, but also by other factors, such as personal dispositions, mood, expectations, previous experiences, or health (Rugulies, 2013). Such 'worker-report bias' might have caused under- and overestimations of associations between psychosocial work characteristics and mental LTSA. Previously, Persson & Kristiansen (2012) argued that worker-reported psychosocial work characteristics should not be interpreted as actual work environmental exposures. For this study, the precise measurement of actual psychosocial work characteristics was of lesser concern because we were interested in mental LTSA predictions based on how workers perceive and appraise their work. However, we could not rule out that workers with mental illness filled in the health survey questionnaire in a state-dependent manner. For example, workers with depressive symptoms may perceive and appraise their work more negatively than those without depressive symptoms. This type of information bias over-estimates the associations between psychosocial work characteristics and mental LTSA (Hanebuth et al., 2006).

Finally, we did not adjust for all psychosocial work characteristics and all potential confounders. Such an analysis would have been possible for all-cause LTSA, but for mental LTSA a multivariable logistic regression model including all work characteristics, sociodemographics, work factors, and baseline mental health resulted in statistical overfitting [data not shown]. Therefore, we adjusted for sociodemographics, work factors, and baseline mental health in separate logistic regression models.

Implications for practice and suggestions for further research

In univariate analysis, perceived feedback about one's performance was prospectively associated with (mental) LTSA. Supervisors and managers might be able to reduce (mental) LTSA by giving information about the purpose and results of the work, and by telling how well workers do their work. However, according to the JD-R model, associations between worker-reported work characteristics and (mental) health outcomes differ across workplaces. The heterogeneity reported by Stansfeld & Candy (2006) in their systematic review and meta-analysis of psychosocial work characteristics and mental health supports this JD-R statement. Therefore, more feedback about one's performance may not be the cue for managing (mental) LTSA in other workplace settings. Supervisors should consider measuring psychosocial work characteristics to get insight in the job demands and resources in their department.

The present results showed that worker-reported psychosocial work characteristics poorly discriminated between initially non-sicklisted workers with and without incident mental LTSA during a 2-year follow-up period. An AUC of 0.65 indicates that for any random pair of workers, the prediction model correctly assigns the highest risk to the worker with mental LTSA in 65% of the cases. Based on this poor discriminative ability and the aforementioned heterogeneity of associations between psychosocial work characteristics and mental health, we conclude that it would not be useful to include psychosocial work characteristics in a tool for identifying workers at increased risk of mental LTSA. The QEEW measures perceived psychosocial work characteristics, but not the importance workers accredit to these characteristics. It is conceivable that work characteristics have more impact on mental health if they are valued important by a given worker employed in a given workplace setting. Abma et al. (2016) developed a capability set for work questionnaire, which measures the valued aspects of work and incorporates whether a worker is able to achieve what (s)he values in his/her work. It would be interesting to investigate if the capability set for work questionnaire better than the QEEW identifies workers at risk of mental LTSA.

Conclusions

More perceived feedback about one's performance was associated with lower risks of (mental) LTSA among workers in the distribution and transport sector. The other worker-reported psychosocial work characteristics were not related to mental LTSA. A prediction model including psychosocial work characteristics poorly discriminated between workers with and without mental LTSA during 2-year follow-up. Based on these results, we conclude that it is not useful to measure psychosocial work characteristics for the purpose of case-finding workers at risk of mental LTSA.

Declaration of interest

The authors report no conflicts of interest. All authors are responsible for the content and writing of this paper.

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