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## Psychosocial work factors and sickness absence in 31 countries in Europe

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**Background:** The studies on the associations between psychosocial work factors and sickness absence have rarely included a large number of factors and European data. The objective was to examine the associations between a large set of psychosocial work factors following well-known and emergent concepts and sickness absence in Europe. **Methods:** The study population consisted of 14 881 male and 14 799 female workers in 31 countries from the 2005 European Working Conditions Survey. Psychosocial work factors included the following: decision latitude, psychological demands, social support, physical violence, sexual harassment, discrimination, bullying, long working hours, shift and night work, job insecurity, job promotion and work–life imbalance. Covariates were as follows: age, occupation, economic activity, employee/self-employed status and physical, chemical, biological and biomechanical exposures. Statistical analysis was performed using multilevel negative binomial hurdle models to study the occurrence and duration of sickness absence. **Results:** In the models, including all psychosocial work factors together and adjustment for covariates, high psychological demands, discrimination, bullying, low-job promotion and work–life imbalance for both genders and physical violence for women were observed as risk factors of the occurrence of sickness absence. Bullying and shift work increased the duration of absence among women. Bullying had the strongest association with sickness absence. **Conclusion:** Various psychosocial work factors were found to be associated with sickness absence. A less conservative analysis exploring each factor separately provided a still higher number of risk factors. Preventive measures should take psychosocial work environment more comprehensively into account to reduce sickness absence and improve health at work at European level.  
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## Introduction

Sickness absence is considered as a global measure of health status, and as a marker of social, psychological and physical functioning for working populations.<sup>1</sup> It has been shown that the longer the absence, the poorer the health status. Furthermore, sickness absence was found to be a good predictor of subsequent morbidity, including disability and mortality.<sup>2,3</sup> The causes of sickness absence are multifactorial, and work-related factors may play an important role in the occurrence of sickness absence.

Sickness absence leads to substantial human, social and economic costs<sup>4</sup> and, consequently, may be seen as a crucial indicator in occupational health studies. Understanding the role of work-related factors, and especially psychosocial work factors, in sickness absence may be useful to better prevent this outcome.

Psychosocial work factors have been evaluated using various theoretical models that appeared in the literature within the last 2 or 3 decades. Job strain model developed by Karasek *et al.*<sup>5</sup> is composed of three main dimensions, psychological demands, decision latitude comprising two sub-dimensions, skill discretion and decision

authority and social support at work. Effort–reward imbalance model focusses on effort at work and reward in terms of esteem, job promotion and job security.<sup>6</sup> Other concepts have emerged more recently related to workplace violence, such as physical violence,<sup>7</sup> sexual harassment,<sup>8</sup> discrimination<sup>9</sup> and bullying,<sup>10</sup> long working hours,<sup>11</sup> job insecurity<sup>12</sup> or work–life imbalance.<sup>13</sup> These factors have been found to be associated with health outcomes, such as cardiovascular diseases and mental disorders in prospective studies,<sup>14,15</sup> but for the most recent concepts, the literature remains sparse. Furthermore, previous studies explored some of these psychosocial work factors, but not all these factors together, making their respective effects on health outcomes difficult to disentangle. Some studies reported significant effects of psychological demands, decision latitude, its two sub-dimensions and/or social support on sickness absence.<sup>16–18</sup> However, emergent factors have been still understudied in association with sickness absence. Some of them have been found to be associated with sickness absence, such as workplace violence, bullying, job insecurity or work–family imbalance, but these factors have been rarely studied altogether.<sup>19–24</sup> There were some rare studies covering a wide set of factors simultaneously, but most of them focused on specific occupational groups,<sup>21,22,25</sup> making generalizations of the results difficult, except two studies based on the Danish working population.<sup>26,27</sup> Furthermore, these studies did not always take important confounders into account, especially those related to the physical working environment. The studies examined working populations from specific or national settings, but never considered European samples, except one that focussed on Karasek *et al.*'s factors only.<sup>16</sup> As underlined by Lund *et al.*,<sup>28</sup> international comparisons of sickness absence and its underlying causes are urgently needed to increase the scientific knowledge in this research area.

The present study was consequently an attempt to consider a wide range of psychosocial work factors in relation to sickness absence in a large European sample, taking other occupational exposures into account. The objectives of the study were to explore the associations between various measures of psychosocial work factors and sickness absence using the presence and duration of absence. This study had the originality to be based on a large harmonized European database covering 31 countries, and to examine various measures of psychosocial work factors following well-known theoretical models and emergent concepts.

## Methods

The fourth European Working Conditions Survey was carried out by the European Foundation for the improvement of living and working conditions (Eurofound) in 2005.<sup>29</sup> This periodical survey aims at providing information on working conditions in countries in Europe and may be considered as a major source of harmonized and comparable data. The survey covered 25 European Union countries plus four acceding and candidate countries and two members of the European Free Trade Association, making a total of 31 countries. The sample is representative of the persons in employment (employees and self-employed, according to the Eurostat definition). In each country, the European Working Conditions Survey sample followed a multistage, stratified and clustered design with a 'random walk' procedure for the selection of the respondents. All interviews were conducted face-to-face in the respondent's own household. Details on sampling design may be found elsewhere.<sup>29</sup> The sample included 29 680 workers, 14 881 men and 14 799 women, with a co-operation rate, often reported as a response rate, i.e. proportion of completed interviews to all eligible units contacted of 66%.<sup>29</sup>

Sickness absence was measured by the following two items: whether or not the respondent had been absent for health-related reasons within the past 12 months, and if yes, how many days the respondent had been absent from work for these reasons.

Consequently, the following two variables were used: sickness absence (yes/no) and number of sickness absence days within the past 12 months. Maternity leave and absence from work to care for a sick child were not included.

Fifteen psychosocial work factors were studied, following well-known models and concepts (Supplementary Appendix 1). The following three measures for Karasek *et al.*'s<sup>5</sup> dimensions were constructed: psychological demands (five items), decision latitude (four items for skill discretion, seven items for decision authority) and social support (four items). Cronbach  $\alpha$ s were 0.62, 0.78, 0.58, 0.76 and 0.67, respectively, for psychological demands, decision latitude, skill discretion, decision authority and social support. The scores were dichotomized at the median of the total sample. The following four factors were related to exposure to workplace violence (i.e. being victim of violence): physical violence (three items), sexual harassment (one item), discriminations (seven items) and bullying (one item). The exposure to violence was defined by the exposure to at least one situation. The following three working time variables were studied: long working hours ( $\geq 48$  h/week), night work ( $\geq 4$  nights/month) and shift work (either permanent or alternating/rotating shifts), each measured using one item. Other factors included job insecurity (one item for fear to lose job: agree/strongly agree vs. neither agree nor disagree/disagree/strongly disagree), job promotion (three items) and work–family imbalance (one item for working hours fitting in with family/social commitments outside work: not at all well/not very well vs. well/very well). The score for job promotion, as a measure of the sub-dimension of reward in effort–reward imbalance model, was dichotomized at the median of the total sample.

Several covariates were included, such as age, number of workers in household, occupation coded using the International Standard Classification of Occupations, economic activity of the company coded using the European classification of economic activities, self-employed/employee status and other occupational exposures of a physical, chemical, biological and biomechanical nature (Supplementary Appendix 1). The scores for these exposures were dichotomized at the median in the total sample.

The number of sickness absence days is a form of count data (Supplementary figures S1 and S2), and most previous studies used Poisson regression models to analyse this variable. This study analysed the association between psychosocial work factors and sickness absence using a recent statistical method, negative binomial hurdle (NBH) model, that allows the study of the presence of sickness absence and its duration. This model allows to take the following two specific features of sickness absence data into account:<sup>30</sup> (i) greater spread in the values (overdispersion) and (ii) greater heterogeneity in the form of excess zeros (zero-inflation) compared with what could be reasonably expected in the simple non-inflated Poisson and negative binomial models. This model leads to divide the analysis into the following two parts: (i) the zero-inflated part of the model predicts the odds of having at least one sickness absence day associated with each independent variable using a logistic regression analysis among the total sample, and (ii) the negative binomial part of the model produces the ratio of mean values for the number of absence days associated with each independent variable using a log–linear model among the sub-sample having at least one absence day. Furthermore, as the data included three hierarchical levels, the 29 680 workers being nested within 338 regions, themselves nested within 31 countries, all analyses were done using multilevel modelling. Indeed, multilevel models are particularly appropriate to study data organized at more than one level (nested data), and to take the within- and between-variability induced by the hierarchical structure in the data into account.

The statistical analysis included several steps. Firstly, each psychosocial work factor was studied in separate models with adjustment for age and number of workers in household. Secondly, each factor was studied separately with adjustment for all covariates. Finally, all factors were studied as independent variables simultaneously in the

same model with adjustment for covariates. Interaction terms were tested between the country-level variable and each psychosocial work factor to examine the differences in the effects of each factor according to country.

All statistical analyses were performed for each gender separately using SAS.

## Results

The study was based on a sample of 14 881 men and 14 799 women. Significant differences were observed between genders for age, occupations, economic activities, self-employed/employee status, occupational exposures and most psychosocial work factors (table 1). The study of the interrelations between psychosocial work factors showed that most of these factors were strongly associated.

The rate of at least one absence day was significantly higher for women (25.7%) than for men (22.2%) within the past 12 months ( $P < 0.0001$ ). There was no significant gender difference in the mean of absence days: 22.0 days (standard deviation: 39.6) for women and 22.1 days (standard deviation: 36.5) for men among the sub-sample of those having at least one absence day. Significant differences between countries were observed for the presence and duration of absence (Supplementary table S1).

After adjustment for age and number of workers in household, each psychosocial work factor was significantly associated with the presence of at least one absence day for both genders, except social support (table 2). Long working hours were observed to be a protective factor for both genders. The strongest association was found for bullying for both genders (OR = 2.49 for men, OR = 2.17 for women). Low-social support and job insecurity increased the number of absence days among both genders. The duration of sickness absence also increased with low-skill discretion, low-decision authority and low-decision latitude for men, and bullying, shift work and low-job promotion for women. The two strongest associations with absence duration were the following: men exposed to low-decision latitude had 27% more absence days than men who were not exposed, and women exposed to bullying had 35% more absence days than non-exposed women.

Table 3 provides the results for the study of each psychosocial work factor separately after adjustment for all covariates. The factors associated with the occurrence of sickness absence were high-psychological demands, physical violence, sexual harassment, discrimination, bullying, job insecurity, low-job promotion and work-life imbalance for both genders, and low-decision authority and shift work for women only. The duration of sickness absence increased with low-decision latitude for men, and with bullying, shift work, and low-job promotion for women. Bullying had the strongest association with the presence of sickness absence for both genders (OR = 2.28 and OR = 1.89 for men and women) and with the duration of sickness absence among women (women exposed to bullying had 33% more absence days than non-exposed women). Physical violence, sexual harassment and discrimination were also strong risk factors for the presence of absence with ORs ranging from 1.44 to 1.79 for both genders.

When all psychosocial work factors were studied simultaneously with adjustment for covariates (table 4), high psychological demands, discrimination, bullying, low-job promotion and work-life imbalance for both genders and physical violence for women were risk factors for having at least one absence day. Long working hours were a protective factor of sickness absence for both genders. Two factors were observed as risk factors for the duration of sickness absence: bullying and shift work among women. Bullying remained the strongest risk factor for the presence of absence for both genders (OR = 1.88 and OR = 1.55 for men and women), and for the duration of absence for women, increasing the duration of absence by 30% for exposed women.

The study of interaction terms between country and each psychosocial work factor in association with the presence of absence showed that the associations between psychosocial work factors and sickness absence (in terms of ORs) were similar across countries. A number of significant interactions were observed between country and psychosocial work factors for the duration of absence [i.e. differences in terms of mean ratios (MRs)]. The risk factors for absence duration were the following: low-decision latitude in Belgium and Luxembourg, low-social support in Finland, shift work in Italy and Turkey, job insecurity in Finland and work-life imbalance in Luxembourg and UK for men, and high-psychological demands in Sweden, low-social support in Finland, bullying in Denmark and Finland, job insecurity in Denmark, Finland, Hungary and Turkey, and low reward in Finland, France and Sweden for women (data not shown).

## Discussion

### Main results

Fifteen psychosocial work factors were studied in association with sickness absence. Multivariate analysis, including all psychosocial work factors together and adjustment for covariates, showed that high-psychological demands, discrimination, bullying, low-job promotion and work-life imbalance were risk factors of the occurrence of sickness absence for both genders. Physical violence was an additional risk factor for women. In addition, bullying and shift work increased the duration of sickness absence among women. A less conservative analysis, including each psychosocial work factor separately, and not altogether, displayed a still higher number of risk factors.

### Strengths and limitations of the study

This study has several strengths. It was based on a large sample of the European working population, covering 31 countries and making a separate analysis of men and women possible. The response rate was satisfactory, and the survey was based on a face-to-face interview at home. The study included a large variety of psychosocial work factors, including a number of emergent factors and other occupational exposures. A recent statistical method (NBH model) was used and allowed to study the presence and duration of absence separately. Furthermore, we used multilevel modelling that allowed to take account of the hierarchical nature of the data. We took important covariates/confounders into account, those related to physical work environment, but also calibration variables that were used to make the study representative of the European working population at national level. Expected findings were observed for these covariates confirming the results from the literature, and the validity of our results. Indeed, older age, lower occupational groups and exposures of a physical-chemical-bio-mechanical nature increased the risk of sickness absence, confirming previous results.<sup>1,18,27,28,31</sup>

However, some limitations of the present study must be considered. The study design was cross-sectional; thus, no causal conclusion could be drawn from the study. The outcome of sickness absence was based on self-reports; however, studies reported a high agreement between self-reported sickness absence and information from official registers.<sup>32</sup> Furthermore, self-reported sickness absence may be useful in such a large European sample because it may be less dependent of practices and regulations in each country. However, the number of spells of absence within the past 12 months was not available for the study. Psychosocial work factors were not based on validated questionnaires, but other studies underlined the validity and interest of constructing proxies.<sup>33</sup> In addition, previous analyses on the data provided satisfactory psychometric properties.<sup>34</sup> Some psychosocial work factors may have been neglected, such as emotional demands, role conflicts, quality of

**Table 1** Description of the population studied for men and women

Variables	Men N (%)	Women N (%)	P-value
Age (years)			***
<30	2992 (20.1)	2875 (19.5)	
30–39	3854 (26.0)	3927 (26.6)	
40–49	3876 (26.1)	4096 (27.7)	
50–59	3068 (20.7)	3119 (21.1)	
≥60	1057 (7.1)	745 (5.1)	
Occupations (ISCO)			***
Managers	1405 (9.5)	782 (5.3)	
Professionals	1679 (11.3)	2377 (16.2)	
Technicians/associate professionals	1650 (11.2)	2619 (17.8)	
Clerical support workers	1089 (7.4)	2633 (17.9)	
Service and sales workers	1317 (8.9)	2340 (15.9)	
Skilled agricultural, forestry and fishery workers	754 (5.1)	344 (2.3)	
Craft and related trades workers	3184 (21.5)	780 (5.3)	
Plant and machine operators and assemblers	1682 (11.4)	482 (3.3)	
Elementary occupations, armed forces	2040 (13.8)	2350 (16.0)	
Economic activities (NACE)			***
Agriculture, hunting, forestry and fishing	1070 (7.2)	542 (3.7)	
Mining, quarrying, manufacturing, electricity, gas and water	3401 (23.1)	1991 (13.6)	
Construction	1721 (11.7)	242 (1.7)	
Services	8505 (57.9)	11 868 (81.1)	
Work status			***
Self-employed	3010 (20.3)	1578 (10.7)	
Employee	11 824 (79.7)	13 171 (89.3)	
Physical exposure <sup>a</sup>			***
High	8363 (56.4)	5203 (35.3)	
Low	6467 (43.6)	9549 (64.7)	
Chemical exposure <sup>a</sup>			***
High	9647 (65.0)	6491 (44.0)	
Low	5186 (35.0)	8257 (56.0)	
Biological exposure			NS
High	2992 (20.2)	2948 (20.0)	
Low	11 802 (79.8)	11 792 (80.0)	
Biomechanical exposure <sup>a</sup>			***
High	8012 (54.1)	6602 (44.8)	
Low	6810 (45.9)	8143 (55.2)	
Skill discretion <sup>a</sup>			*
Low	7030 (47.7)	7208 (49.2)	
High	7699 (52.3)	7436 (50.8)	
Decision authority <sup>a</sup>			***
Low	6997 (47.4)	8303 (56.7)	
High	7763 (52.6)	6353 (43.4)	
Decision latitude <sup>a</sup>			***
Low	6846 (46.8)	7732 (53.2)	
High	7794 (53.2)	6810 (46.8)	
Psychological demands <sup>a</sup>			***
High	7713 (52.3)	6818 (46.5)	
Low	7043 (47.7)	7835 (53.5)	
Social support <sup>a</sup>			**
Low	6770 (48.2)	6568 (46.2)	
High	7288 (51.8)	7638 (53.8)	
Physical violence <sup>b</sup>			NS
Yes	1074 (7.2)	1134 (7.7)	
No	13 778 (92.8)	13 632 (92.3)	
Sexual harassment			***
Yes	141 (1.0)	486 (3.3)	
No	14 683 (99.0)	14 253 (96.7)	
Discrimination <sup>b</sup>			***
Yes	745 (5.0)	935 (6.3)	
No	14 103 (95.0)	13 832 (93.7)	
Bullying			***
Yes	802 (5.4)	1103 (7.5)	
No	14 013 (94.6)	13 626 (92.5)	
Long working hours			***
≥48 h/week	3825 (26.7)	1764 (12.3)	
<48 h/week	10 494 (73.3)	12 623 (87.7)	
Night work			***
≥4 nights/month	2573 (17.7)	1438 (9.9)	
<4 nights/month	11 942 (82.3)	13 119 (90.1)	
Shift work			***
Yes	2220 (15.2)	2444 (16.8)	
No	12 418 (84.8)	12 092 (83.2)	

(continued)

**Table 1** Continued

Variables	Men N (%)	Women N (%)	P-value
Job insecurity			NS
Yes	2308 (16.4)	2203 (15.8)	
No	11 802 (83.6)	11 755 (84.2)	
Job promotion <sup>a</sup>			***
Low	6195 (42.0)	6613 (45.1)	
High	8553 (58.0)	8060 (54.9)	
Work-life imbalance			***
Yes	3421 (23.2)	2729 (18.5)	
No	11 339 (76.8)	11 988 (81.5)	

NS, not significant; ISCO, International Standard Classification of Occupations; NACE, European classification of economic activities.

a: Score dichotomized at the median of the total sample.

b: Exposure defined by at least one situation.

\* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$  (chi-square test for the comparison between men and women).

**Table 2** Sickness absence according to psychosocial work factors for men and women (results from multilevel NBH model, OR, MR and 95% CI); each psychosocial work factor studied separately with adjustment for age and number of workers in household

Psychosocial work factors	Men		Women	
	Zero-inflated part OR (95% CI)	Negative binomial part MR (95% CI)	Zero-inflated part OR (95% CI)	Negative binomial part MR (95% CI)
Low-skill discretion	<b>1.24 (1.14–1.35)</b>	<b>1.22 (1.09–1.36)</b>	<b>1.16 (1.07–1.25)</b>	1.07 (0.96–1.18)
Low-decision authority	<b>1.32 (1.22–1.44)</b>	<b>1.24 (1.11–1.39)</b>	<b>1.29 (1.19–1.40)</b>	1.07 (0.96–1.18)
Low-decision latitude	<b>1.35 (1.24–1.46)</b>	<b>1.27 (1.13–1.42)</b>	<b>1.20 (1.11–1.30)</b>	1.08 (0.98–1.20)
High psychological demands	<b>1.34 (1.24–1.45)</b>	1.04 (0.93–1.17)	<b>1.48 (1.37–1.61)</b>	1.09 (0.99–1.21)
Low-social support	0.99 (0.91–1.08)	<b>1.17 (1.04–1.32)</b>	1.03 (0.95–1.12)	<b>1.13 (1.02–1.25)</b>
Physical violence	<b>1.57 (1.37–1.81)</b>	1.00 (0.83–1.20)	<b>1.72 (1.51–1.97)</b>	1.14 (0.98–1.33)
Sexual harassment	<b>1.58 (1.10–2.28)</b>	0.74 (0.46–1.19)	<b>1.55 (1.27–1.89)</b>	1.08 (0.85–1.37)
Discrimination	<b>1.92 (1.63–2.25)</b>	1.19 (0.96–1.46)	<b>1.87 (1.62–2.16)</b>	0.96 (0.81–1.13)
Bullying	<b>2.49 (2.14–2.90)</b>	1.10 (0.92–1.33)	<b>2.17 (1.90–2.48)</b>	<b>1.35 (1.16–1.56)</b>
Long working hours	<b>0.77 (0.70–0.85)</b>	0.95 (0.82–1.10)	<b>0.82 (0.72–0.93)</b>	0.99 (0.83–1.18)
Night work	<b>1.15 (1.03–1.27)</b>	0.99 (0.86–1.14)	<b>1.19 (1.05–1.35)</b>	1.11 (0.95–1.30)
Shift work	<b>1.26 (1.13–1.41)</b>	1.12 (0.97–1.30)	<b>1.34 (1.21–1.48)</b>	<b>1.21 (1.07–1.37)</b>
Job insecurity	<b>1.39 (1.25–1.54)</b>	<b>1.18 (1.03–1.37)</b>	<b>1.27 (1.15–1.42)</b>	<b>1.20 (1.05–1.37)</b>
Low-job promotion	<b>1.32 (1.22–1.43)</b>	1.10 (0.98–1.23)	<b>1.34 (1.24–1.45)</b>	<b>1.22 (1.10–1.34)</b>
Work-life imbalance	<b>1.33 (1.21–1.46)</b>	1.11 (0.97–1.26)	<b>1.47 (1.33–1.61)</b>	1.09 (0.97–1.23)

Adjusted for age and number of workers in household.

Bold: OR/MR significant at 5%.

leadership or organizational justice, that were found as risk factors for sickness absence in other studies.<sup>21,22,26,27,35,36</sup> A reporting bias might be suspected related to common method variance, as exposures and outcome were self-reported and might have led to an overestimation of the associations observed. Our study did not take previous illness into account, and consequently, was unable to test its potential impact on the association between psychosocial work factors and sickness absence. Finally, healthy worker effect may be suspected (unhealthy workers may have changed to less exposed jobs or left the labour market) leading to an underestimation of the associations between exposures and sickness absence.

### Comparison with the literature

Long working hours were a protective factor of the occurrence of sickness absence. Such a protective effect was also reported in the literature,<sup>37</sup> and might be explained by a healthy worker effect; only healthy workers may be able to do long working hours, something that is not incompatible with harmful long-term effects on health.<sup>11</sup> Another explanation may be that long working hours may be associated with a higher pressure at work and with a higher difficulty for workers to take sickness absence. As shown previously,<sup>38</sup> working >48 h/week decreased sickness absenteeism, but increased sickness presenteeism. High-psychological demands

were already observed as a risk factor of sickness absence by others in the literature.<sup>16,28</sup> Bullying was observed as a risk factor of sickness absence in our study, confirming the findings from two previous studies among Finnish female hospital employees<sup>20</sup> and among Swedish female public sector workers.<sup>24</sup> To our knowledge, no previous study found an association between discrimination and sickness absence. However, our results are in line with other studies reporting the impact of discrimination on other health outcomes and of physical violence on sickness absence.<sup>9,22</sup> Low-job promotion increased the risk of sickness absence in our study, in agreement with one previous study among male employees of three companies in a Dutch province.<sup>39</sup> Work-life imbalance was found as a risk factor of sickness absence, in agreement with some rare studies that underlined its role among female Dutch workers,<sup>19</sup> and for both genders among Finnish municipal employees.<sup>23</sup> Finally, shift work was a risk factor for the duration of sickness absence among women, although the rare previous studies provided inconclusive results.<sup>40</sup> A limited number of factors were found as risk factors for the duration of sickness absence in our study. The statistical method (NBH model) we used may explain this, as it led to study the duration of absence among those who had at least one absence day. Previous studies, which examined the duration of sickness absence among the whole studied sample (with or without any absence day), may have been unable to disentangle the occurrence from the duration of

**Table 3** Psychosocial work factors and sickness absence for men and women (results from multilevel NBH model, OR, MR and 95% CI); each psychosocial work factor studied separately with adjustment for all covariates

Psychosocial work factors	Men		Women	
	Zero-inflated part OR (95% CI)	Negative binomial part MR (95% CI)	Zero-inflated part OR (95% CI)	Negative binomial part MR (95% CI)
Low-skill discretion	1.09 (1.00–1.19)	1.07 (0.95–1.20)	1.06 (0.97–1.16)	0.95 (0.85–1.06)
Low-decision authority	1.01 (0.92–1.11)	1.13 (1.00–1.27)	<b>1.09 (1.00–1.19)</b>	1.01 (0.90–1.13)
Low-decision latitude	1.05 (0.96–1.16)	<b>1.14 (1.01–1.29)</b>	1.02 (0.94–1.12)	0.97 (0.87–1.08)
High psychological demands	<b>1.15 (1.06–1.26)</b>	1.01 (0.90–1.13)	<b>1.26 (1.15–1.36)</b>	1.03 (0.93–1.15)
Low-social support	1.02 (0.94–1.11)	1.12 (1.00–1.26)	1.04 (0.96–1.13)	1.07 (0.97–1.19)
Physical violence	<b>1.53 (1.32–1.78)</b>	1.01 (0.84–1.22)	<b>1.57 (1.36–1.80)</b>	1.11 (0.95–1.31)
Sexual harassment	<b>1.60 (1.09–2.35)</b>	0.76 (0.47–1.22)	<b>1.44 (1.17–1.76)</b>	1.02 (0.80–1.31)
Discrimination	<b>1.79 (1.52–2.12)</b>	1.15 (0.94–1.41)	<b>1.69 (1.46–1.95)</b>	0.94 (0.79–1.11)
Bullying	<b>2.28 (1.95–2.68)</b>	1.10 (0.91–1.32)	<b>1.89 (1.65–2.17)</b>	<b>1.33 (1.14–1.55)</b>
Long working hours	0.90 (0.81–1.00)	0.92 (0.79–1.06)	0.88 (0.77–1.01)	0.91 (0.75–1.09)
Night work	1.10 (0.98–1.22)	0.96 (0.83–1.11)	1.05 (0.92–1.20)	1.01 (0.86–1.19)
Shift work	1.07 (0.95–1.20)	1.08 (0.93–1.26)	<b>1.13 (1.02–1.26)</b>	<b>1.15 (1.01–1.31)</b>
Job insecurity	<b>1.24 (1.11–1.38)</b>	1.13 (0.98–1.30)	<b>1.17 (1.05–1.30)</b>	1.14 (1.00–1.31)
Low-job promotion	<b>1.27 (1.16–1.38)</b>	1.07 (0.96–1.20)	<b>1.25 (1.15–1.35)</b>	<b>1.16 (1.05–1.29)</b>
Work-life imbalance	<b>1.31 (1.19–1.44)</b>	1.07 (0.94–1.21)	<b>1.37 (1.24–1.52)</b>	1.01 (0.89–1.14)

Adjusted for age, number of workers in household, occupation, economic activity, employee/self-employed status, physical, chemical, biological and biomechanical exposures.

Bold: OR/MR significant at 5%.

**Table 4** Psychosocial work factors and sickness absence for men and women (results from multilevel NBH model, OR, MR and 95% CI); all psychosocial work factors were studied simultaneously with adjustment for all covariates

Psychosocial work factors	Men		Women	
	Zero-inflated part (N = 12 059) OR (95% CI)	Negative binomial part (N = 2758) MR (95% CI)	Zero-inflated part (N = 12 250) OR (95% CI)	Negative binomial part (N = 3184) MR (95% CI)
Low-decision latitude	0.97 (0.88–1.08)	1.10 (0.96–1.26)	0.96 (0.87–1.06)	0.93 (0.83–1.05)
High psychological demands	<b>1.13 (1.03–1.24)</b>	1.00 (0.88–1.13)	<b>1.18 (1.08–1.29)</b>	1.05 (0.94–1.17)
Low-social support	0.96 (0.87–1.05)	1.09 (0.96–1.24)	0.99 (0.90–1.08)	1.05 (0.94–1.18)
Physical violence	1.11 (0.93–1.32)	0.94 (0.76–1.17)	<b>1.22 (1.04–1.43)</b>	1.00 (0.83–1.19)
Sexual harassment	1.06 (0.68–1.63)	0.79 (0.47–1.32)	1.07 (0.85–1.36)	0.91 (0.70–1.19)
Discrimination	<b>1.39 (1.15–1.68)</b>	1.14 (0.91–1.43)	<b>1.30 (1.09–1.54)</b>	0.90 (0.74–1.09)
Bullying	<b>1.88 (1.56–2.26)</b>	1.10 (0.89–1.37)	<b>1.55 (1.32–1.82)</b>	<b>1.30 (1.09–1.54)</b>
Long working hours	<b>0.83 (0.74–0.94)</b>	0.96 (0.82–1.13)	<b>0.80 (0.69–0.94)</b>	0.85 (0.69–1.04)
Night work	1.00 (0.87–1.15)	0.92 (0.76–1.10)	0.93 (0.80–1.09)	0.95 (0.79–1.15)
Shift work	1.02 (0.89–1.18)	1.13 (0.95–1.36)	1.06 (0.94–1.20)	<b>1.23 (1.06–1.43)</b>
Job insecurity	1.10 (0.97–1.24)	1.06 (0.91–1.23)	1.08 (0.96–1.21)	1.13 (0.98–1.31)
Low-job promotion	<b>1.18 (1.08–1.30)</b>	1.05 (0.93–1.18)	<b>1.18 (1.08–1.29)</b>	1.11 (0.99–1.23)
Work-life imbalance	<b>1.29 (1.16–1.45)</b>	1.10 (0.95–1.27)	<b>1.26 (1.12–1.41)</b>	1.00 (0.87–1.16)

Adjusted for age, number of workers in household, occupation, economic activity, employee/self-employed status, physical, chemical, biological and biomechanical exposures.

Bold: OR/MR significant at 5%.

absence and, consequently, may have overestimated the role of the factors studied on the duration of absence.

Our study of differences in the association between psychosocial work factors and sickness absence between countries suggested that there may be differences for duration of absence and not for the occurrence of absence. Although surprising at first sight, these results might be explained by differences in regulations on sickness absence between countries.<sup>41</sup> Indeed, the associations were found mainly in some countries, especially Belgium, Denmark, Finland, Luxembourg and Sweden, i.e. countries with high levels of paid sickness benefit. People exposed to psychosocial work factors might be more able to take higher duration of sickness absence in these countries, and/or exposed people might be less able to do so in other countries.

In our models with all psychosocial work factors studied simultaneously (table 4), the significant associations found were independent of the other psychosocial work factors taken into account. As

underlined by Rugulies *et al.*,<sup>22,27</sup> there may be overlaps between concepts or some factors may be causes or consequences of other factors. Because of the unclear nature of the associations between psychosocial work factors, these authors suggested to study each factor separately and not to adjust for all factors together. Our models (table 4) may, thus, be based on a conservative approach. Indeed, the significant associations reported in table 4 were also found when studying each factor separately, but the following additional risk factors were observed: sexual harassment and job insecurity among both genders, physical violence among men and shift work among women for the occurrence of absence, and decision latitude among men and job promotion among women for the duration of absence (table 3). Other studies supported that low-decision latitude and/or its sub-dimensions (skill discretion and decision authority),<sup>16–18,22</sup> low-social support<sup>17,18</sup> and job insecurity were risk factors of sickness absence,<sup>21</sup> and sexual harassment a risk factor for other health outcomes.<sup>8</sup>

## Conclusion

Our study underlined that various psychosocial work factors may play a role in the occurrence of sickness absence, but their role may be more limited in the duration of absence. Not only well-known factors, such as psychological demands, but also more recent factors were observed as risk factors. As studies using comparative European data are seldom on this topic, this study may provide some elements for guiding preventive actions that should take psychosocial work factors more comprehensively into account to reduce the burden of sickness absence and improve the health of European workers.

## Supplementary Data

Supplementary data are available at *EURPUB* online.

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### Key points

- Well-known and emergent psychosocial work factors were found to be associated with sickness absence among the working populations of 31 countries in Europe.
- Some specific psychosocial work factors were found as risk factors according to gender.
- The psychosocial work factors observed as risk factors were associated more with the occurrence of absence than with its duration.
- Preventive actions focussing on psychosocial work factors more comprehensively may contribute to reduce the burden of sickness absence at European level.

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## Why do those out of work because of sickness or disability have a high mortality risk? Evidence from a Scottish cohort

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**Background:** Existing evidence on the association between being out of work because of sickness or disability and high mortality risk suggests that most of the association cannot be explained by controlling for health, health behaviour or socio-economic position. However, studies are often based on administrative data that lack explanatory factors. Here, we investigate this high mortality risk using detailed information from a cohort study. **Methods:** Data from the West of Scotland Twenty-07 prospective cohort study were used to follow those (average age 56 years) employed, unemployed and out of work in 1988 to death or end of follow-up in 2011. Using a parametric survival model, mean survival was calculated for each employment group after adjustment for health behaviours, health and socio-economic position. **Results:** The difference in survival between those sick or disabled (30% survival at end of follow-up), and those unemployed (49%) or employed (61%) was mostly accounted for by adjusting for the higher levels of poor health at baseline in the former group (49, 46 and 56%, respectively, after adjustment). After controlling for all variables, the difference between those sick or disabled (51%) and those employed (56%) was further attenuated slightly. **Conclusion:** Our results suggest that the present health of those out of work and sick or disabled should be taken seriously, as their long-term survival prospects are considerably poorer than other employment groups.  
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### Introduction

In recent decades, there has been a substantial rise in the percentage of the workforce out of work because of sickness or disability, and claiming related benefits, in many developed countries.<sup>1</sup> This is concerning because research has shown that as a group, they have a much higher mortality risk than both those employed and unemployed (out of work but actively seeking work).<sup>2–5</sup> The reasons for this excess mortality risk are not clear, despite a growing number of studies; a particular issue of contention is whether the excess mortality is mostly because of higher levels of baseline sickness or disability within this group.<sup>6</sup> Alternative explanations include worse health behaviours or higher levels of socio-economic disadvantage.<sup>5</sup> These are difficult to assess, as studies have tended to lack comprehensive physical, mental and self-rated health measures in addition to health behavioural and socio-economic measures. One reason for this is that population-level studies are often based on administrative data sets linked to mortality records, which although powerful in terms of size, lack explanatory information. Even survey based studies in the UK and

elsewhere have found that after adjustment for health, health behaviours and socio-economic differences, the raised mortality rate of those out of work because of sickness or disability is not explainable.<sup>5,7</sup> However, the factors adjusted for in these studies were still not extensive, which leaves open the possibility that the unexplained excess could be further attenuated with the addition of further and/or more appropriate baseline measures.<sup>8</sup>

In this article, we add to the literature by exploring the reasons for this excess mortality using a detailed cohort study from the West of Scotland.<sup>9</sup> The study area experienced a large growth in those out of work because of sickness or disability particularly from the 1980s onwards related to the deindustrialization occurring.<sup>10</sup> There is evidence, in this region, the UK as a whole<sup>10</sup> and internationally,<sup>11</sup> that much of this rise is a form of hidden unemployment among workers vulnerable to losing their jobs (lower social class and sick or disabled) who then are also least likely to regain work, particularly in poor labour markets. As a consequence, the employment rate of those sick or disabled, particularly those in low social class positions, has fallen in this period<sup>12</sup> and, hence, may also have importance for health inequalities.<sup>13</sup>