Classic and emergent psychosocial work factors and mental health

Isabelle Niedhammer, T. Lesuffleur, E. Algava, J. F. Chastang

HAL Id: hal-01427194
https://hal.sorbonne-universite.fr/hal-01427194

Classic and emergent psychosocial work factors and mental symptoms

Isabelle Niedhammer[1,2], Thomas Lesuffleur[1,2], Elisabeth Algava[3], Jean-François Chastang[1,2]

[1] INSERM, UMR_S 1136, Pierre Louis Institute of Epidemiology and Public Health, Department of social epidemiology, F-75013, Paris, France

[2] Sorbonne Universités, UPMC Univ Paris 06, UMR_S 1136, Pierre Louis Institute of Epidemiology and Public Health, Department of social epidemiology, F-75013, Paris, France

[3] Ministry of Labour, DARES, Paris, France

Correspondence to:

Dr. Isabelle Niedhammer

INSERM UMRS 1136 – IPLESP, Team 7 (ERES)

Faculté de Médecine Pierre et Marie Curie - pôle Saint-Antoine

27 rue de Chaligny

F-75012 Paris, France

Email: isabelle.niedhammer@inserm.fr

ABSTRACT

Background: Little is known about associations between emergent psychosocial work factors and mental health.

Aims: To explore associations between classical and emergent psychosocial work factors and depression and anxiety symptoms in employees in France.

Methods: A cross-sectional study, based on the SUMER survey, explored psychosocial work factors including psychological demands, decision latitude, social support, reward and its sub-dimensions (esteem, job security and job promotion), bullying, verbal abuse, physical violence/sexual assault, long working hours, shift and night work, unsociable work days, predictability, and demands for responsibility. We measured depression and anxiety symptoms using the HAD scale. We used gender-stratified generalised linear models to adjust for age, occupation and economic activity.

Results: 26,883 men and 20,079 women participated (response rate 87%). Low decision latitude, high psychological demands, low social support, low reward, bullying, and verbal abuse were associated with depression and anxiety in both genders (with Beta coefficients ranging from 0.14 to 1.40). Low predictability was associated with depression and anxiety in men (respectively Beta=0.12 (95% CI: 0.01;0.24) and 0.19 (95% CI: 0.06;0.32)), and long working hours were associated with anxiety in men (Beta=0.48 (95% CI: 0.27;0.69)). The strongest associations were observed for bullying, reward (especially esteem) and psychological demands. Using a less conservative approach, we found more factors to be significantly associated with mental symptoms.

Conclusion: Most psychosocial work factors studied are associated with depression and/or anxiety symptoms. Comprehensive prevention policies may help to reduce exposure to psychosocial work factors, including emergent ones, and improve mental health at work.

Introduction

Mental health at work is a major occupational health issue because of its high social and economic costs [1]. The identification of occupational risk factors for poor mental health is therefore important. Psychosocial work factors may be important risk factors for poor mental health, especially those related to the job strain model [2-5] which are the most studied, and those related to the effort-reward imbalance model [4, 5]. The association between other psychosocial work factors and mental health also merit exploration [3].

The job-strain model, elaborated by Karasek [6] has three main dimensions: psychological demands; decision latitude, comprising two subscales, skill utilization and decision authority; and social support at work from colleagues and supervisor. The combination of high levels of psychological demands and low levels of decision latitude (job strain) may increase the risk of deleterious effects on health, especially mental health. Health risks may also be increased by low levels of support (called iso-strain when combined with job strain). The effort-reward imbalance model, developed by Siegrist [7], includes two dimensions: effort at work, which may be conceptually close to psychological demands, and reward in terms of esteem, job promotion and job security. These have been found, separately or combined as effort-reward imbalance, to be associated with mental health outcomes.

Evidence about associations between other psychosocial work factors and mental health is sparser and weaker. Emerging factors include workplace violence, particularly physical violence [8], sexual harassment [9] and bullying [10], long working hours [11], predictability [12], demands for responsibility [13] and job insecurity [14]. This study aimed to explore the associations between well-known and emergent psychosocial work factors, including those

from the job strain and effort-reward imbalance models, and depression and anxiety symptoms in a national representative working population of employees in France.

Methods

The SUrveillance Médicale des Expositions aux Risques professionnels (SUMER) survey is a national periodical cross-sectional survey from two departments of the French ministry of labour. It aims to describe occupational risks in order to define preventive strategies and research priorities in France. It is based on a voluntary network of occupational physicians who collect data for a random sample of their employees from compulsory medical examinations. Occupational health is mandatory for all employees in France. The 2010 SUMER survey included a questionnaire completed by 2,400 occupational physicians and a self-administered questionnaire. Ethical approval was granted by the Commission Nationale de l'Informatique et des Libertés and Conseil National de l'Information Statistique. We published another study on psychosocial factors at work and sickness absence using the survey data [15].

The self-administered questionnaire included the validated French questionnaire of the job strain model (Job Content Questionnaire, JCQ) [16, 17] for the three dimensions of decision latitude (6 items for skill discretion and 3 items for decision authority), psychological demands (9 items) and social support (4 items for colleague support and 4 items for supervisor support). The internal consistency of these scales was satisfactory (Cronbach's alpha: 0.80 for psychological demands, 0.78 for decision latitude, and 0.82 for social support). We constructed the scores according to Karasek's recommendations and dichotomised at the median of the total sample. We defined job strain by the combination of high psychological

demands and low decision latitude, and iso-strain by the combination of high psychological demands, low decision latitude and low social support.

We measured the dimension of reward (Cronbach's alpha: 0.85, including 5 items for esteem, 2 items for job security and 4 items for job promotion) from the effort-reward imbalance model using the validated French version of this scale [18]. We dichotomised reward and its sub-dimensions at the median of the total sample.

We studied five working time variables: long working hours ($\geq$48 hours/week following the European directive on working time, one item), night work (working between 12 and 5am $\geq$1 night/week, one item), shift work (either permanent or alternating/rotating shifts, one item), unsociable work days (working on Sunday or Saturday $\geq$1 day/week, one item) and predictability (four items: information about time schedules for the next day, week, month and the next three months).

We derived three factors related to workplace violence from Leymann's questionnaire: bullying (one item), verbal abuse (two items) and physical violence or sexual assault (two items) [10]. We defined exposure by at least one situation of workplace violence, when the measure was composed of more than one item.

We also measured demands for responsibility (four items: a mistake in work may lead to serious consequences for product/service quality, to serious financial losses for the company, dangerous consequences for the safety of people or yourself, and to wage/work/job sanctions for yourself) and we dichotomised them at the median of the total sample.

We studied the main dimensions of these psychosocial work factors, as well as the sub-dimensions, i.e. decision latitude and its sub-dimensions, decision authority and skill discretion, social support and its sub-dimensions, support from colleagues and supervisor, and reward and its sub-dimensions, esteem, job security and job promotion.

We measured depression and anxiety symptoms using the Hospital Anxiety and Depression (HAD) scale [19]. The HAD Scale is a 14-item self-report questionnaire, assessing the presence and severity of anxiety symptoms (HAD-A subscale; 7 items) and depression symptoms (HAD-D subscale; 7 items) separately, each subscale being scored from 0 to 21. We studied the two scores as continuous outcomes to explore the severity of each.

Covariates included age, occupation coded using the French classification, which is close to the International Standard Classification of Occupation (ISCO), and economic activity of the company coded using the European classification of economic activities (NACE).

We weighted the data for all analyses using gender, age, nationality, occupation, economic activity, company size, full or part time work, volunteering of occupational physicians, and frequency of occupational health visits to provide nationally representative results of the French working population (22 million employees representing 92% of employees in France, excluding the public sector of education and some ministries).

We compared genders using Student's t-test with Taylor series variance estimation and Rao-Scott Chi-Square test. We studied associations between psychosocial work factors and depression and anxiety using generalised linear models accounting for covariates and weights. As psychosocial work factors were interrelated, we used two types of models. First, we

studied each psychosocial work factor separately with adjustment for covariates. Second, we studied all factors simultaneously (i.e. one psychosocial work factor independently of the other factors, an approach that may be considered conservative) with adjustment for covariates. We detected no co-linearity in these models. We tested the interaction between high psychological demands and low decision latitude following the job strain model hypothesis.

We performed all analyses for men and women separately and using SAS (Statistical Analysis System by SAS Institute Inc., USA).

Results

The sample included 26,883 men and 20,079 women, among the 53940 employees asked to participate. The response rate to the main and self-administered questionnaires was 87%. The description of the sample is presented in Table 1. We observed significant differences between genders. Women were more likely to be exposed to low decision latitude, low skill discretion, low decision authority, job strain, iso-strain and verbal abuse. Men were more likely to be exposed to low esteem, long working hours, night and shift work, unsociable workdays, low predictability, and demands for responsibility.

Table 2 presents the associations between psychosocial work factors and depression and anxiety symptoms, each factor being studied separately with adjustment for covariates. All psychosocial work factors were associated with depression and anxiety symptoms, except night and shift work, and unsociable work days for depression and anxiety in both genders, long working hours for depression in both genders, and physical violence/sexual assault for depression in women. Night and shift work and unsociable workdays were removed from

subsequent analyses, as they were non-significant for both mental health outcomes and genders.

Table 3 presents the associations between psychosocial work factors and depression and anxiety symptoms, using the main dimensions of the job strain model and reward scale, all factors being studied simultaneously with adjustment for covariates. Low decision latitude, high psychological demands, low social support, low reward, bullying, and verbal abuse were found to be associated with depression and anxiety in both genders. Physical violence/sexual assault was negatively associated with depression in women. In men, low predictability increased the risk of depression and anxiety, and long working hours increased the risk of anxiety. The strongest associations were found for bullying and reward for both outcomes, and psychological demands for anxiety. We observed significant interaction between psychological demands and decision latitude suggesting that the association between high psychological demands and depression for both genders (and anxiety for men only) may be stronger when decision latitude is low. Job strain and isostrain (as an independent variable) were also associated with depression and anxiety.

Table 4 shows the results for the sub-dimensions of job strain model and reward scale. The sub-dimensions of decision latitude and social support (skill discretion, decision authority, and support from colleagues and supervisor) were all risk factors for depression in both genders. Low decision authority was associated with anxiety in both genders. Low support from colleagues was a risk factor of anxiety in men. All sub-dimensions of reward (esteem, job insecurity and job promotion) were associated with depression and anxiety in both genders. The strongest associations were observed for esteem for both outcomes.

Discussion

In models exploring all psychosocial work factors simultaneously, we found low decision latitude, high psychological demands, low social support, low reward, bullying, and verbal abuse to be risk factors for depression and anxiety symptoms in both genders. In men, low predictability was associated with depression and anxiety, and long working hours with anxiety. The sub-dimensions of reward were associated with depression and anxiety for both genders. The sub-dimensions of decision latitude and social support increased the risk of depression in both genders. Low skill discretion was associated with anxiety in both genders, and support from colleagues with anxiety in men. Using a less conservative approach exploring each factor separately, we found even more factors significantly associated with mental symptoms. We observed the strongest associations for bullying and reward (especially esteem) with depression and anxiety, and for psychological demands with anxiety symptoms.

The study used a large representative sample of the French national working population, with weighted data, and a good response rate, facilitating generalization of the findings. We also explored associations with both depression and anxiety symptoms, contrary to many previous studies that examined mixed or general mental health outcomes. We performed all analyses separately for men and women, which is important in occupational epidemiology. The self-administered questionnaire included well-established instruments to measure psychosocial work factors: the validated French versions of the JCQ (job-strain model) and of the scale of reward (effort-reward imbalance model), facilitating comparisons with other studies. The self-administered questionnaire also included items of workplace violence derived from Leymann's instrument [10], and other items that were used to measure emergent factors (such as long working hours, predictability, demands for responsibility). We evaluated depression and anxiety using the HAD scale [19], a reliable measure for the presence and severity of

these symptoms. We studied depression and anxiety as two continuous scores to examine severity of symptoms. Additional analyses using the thresholds of 8 or 11 to define possible or subclinical cases of depression and anxiety gave similar results.

Several limitations are worth noting. As the study had a cross-sectional design, the conclusions about statistical associations may not be causal, and reverse causation may not be excluded. A healthy worker effect may have underestimated the associations between psychosocial work factors and mental health outcomes, as sick employees may have left their job, or healthier workers may be more likely to work in more difficult jobs. We measured psychosocial work factors using subjective evaluation, which may be subject to reporting bias. However, objective evaluation has other shortcomings, and would be difficult to use in such a large sample. Self-reporting for both psychosocial work factors and mental health outcomes may have inflated associations because of common method variance. With multiple testing, some results may arise by chance, but as most of the associations were highly significant (p<0.001), this is less likely. However, associations significant at p<0.05 or p<0.01 should be interpreted with caution (predictability as a risk factor and physical violence as a protective factor being intuitively hard to explain). Information about other psychosocial work factors, duration of exposure and covariates may be incomplete.

Dimensions of the job strain model have been studied extensively in association with mental health outcomes. Psychological demands, decision latitude, social support, and job strain are risk factors for depression related outcomes [2-5]. However, there is less evidence for anxiety related outcomes. Some studies found associations with anxiety for some or all job strain model variables [20, 21]. Also, although job strain may be a risk factor, interaction between high psychological demands and low decision latitude has not often been explored. Our

results supported Karasek's job strain hypothesis for depression symptoms and partly for anxiety symptoms. One study found an interaction between psychological demands and decision latitude in association with depression in men [21].

We found reward, in the effort-reward imbalance model, to be a strong risk factor for both depression and anxiety, consistent with previous studies of depression [22]. One study reported association between a proxy for reward and anxiety, when reward was studied separately from other psychosocial work factors [21]. Other studies reported association between effort-reward imbalance and depression [23]. We found job insecurity to be a risk factor, confirming previous findings on depression and/or anxiety symptoms [21, 24, 25]. The other sub-dimensions of reward (esteem and job promotion) have seldom been studied separately. Studies showed that low job promotion was a risk factor for other outcomes such as sickness absence [26].

We found that bullying was associated with depression and anxiety and displayed strong associations: consistent with previous studies of depression [27, 28], but evidence for anxiety is still lacking.

Working time variables were not or weakly associated with depression and anxiety. Long working hours were associated with anxiety in men, consistent with previous studies showing association between long working hours and depression and anxiety in women [29]. Predictability was not associated with mental health measured using five SF-36 items in a previous study [30]. Demands for responsibility were not associated with depression or anxiety in the models taking all factors into account, but they were in the models exploring

each factor separately. To our knowledge, no other study has explored demands for responsibility at work in association with mental health outcomes.

We found very similar results for depression and anxiety in our previous study [21], which might be expected given the high level of co-morbidity between the two outcomes. Indeed, the correlation coefficient between depression and anxiety scores was 0.50 and was highly significant ($p<0.001$) in our study.

When we studied psychosocial work factors simultaneously (Tables 3 and 4), the significant associations found were independent of the other psychosocial work factors taken into account. There may be overlaps between concepts or some factors may be causes or consequences of other factors. Because of the complex nature of the associations between psychosocial work factors, models including each factor separately without adjustment for all factors may be useful. Our models (Tables 3 and 4) may thus be based on a conservative approach. Indeed, we also found significant associations when studying each factor separately (Table 2), but we observed additional significant associations for demands for responsibility, predictability, skill discretion, the two sub-scales of social support and physical violence/sexual assault. This suggests that further studies of emergent factors such as demands for responsibility and predictability may be needed.

We found that many psychosocial work factors were associated with depression and/or anxiety. These factors include classical factors from the job strain model and reward scale, but also emergent factors. Comprehensive prevention policies may help to prevent psychosocial work exposures and improve mental health at work. More studies, especially

prospective studies, would improve our knowledge of the effects of psychosocial work factors, especially emergent factors, on depression and anxiety.

Key points

- Classical psychosocial work factors related to psychological demands, decision latitude, social support and reward were associated with depression and anxiety symptoms in men and women.

- Emergent psychosocial work factors: low esteem, job insecurity, low job promotion, bullying and verbal abuse were associated with anxiety and depression in men and women, and long working hours were associated with anxiety in men.

- The strongest associations were observed for bullying and reward (especially esteem) with anxiety and depression, and for psychological demands with anxiety.

Conflict of interest

None declared.

References

1. Birnbaum HG, Kessler RC, Kelley D, Ben-Hamadi R, Joish VN, Greenberg PE. Employer burden of mild, moderate, and severe major depressive disorder: mental health services utilization and costs, and work performance. *Depress Anxiety* 2010; **27(1)**:78-89.

2. Bonde JP. Psychosocial factors at work and risk of depression: a systematic review of the epidemiological evidence. *Occup Environ Med* 2008; **65(7)**:438-445.

3. Netterstrom B, Conrad N, Bech P, Fink P, Olsen O, Rugulies R*, et al.* The relation between work-related psychosocial factors and the development of depression. *Epidemiol Rev* 2008; **30**:118-132.

4. Siegrist J. Chronic psychosocial stress at work and risk of depression: evidence from prospective studies. *Eur Arch Psychiatry Clin Neurosci* 2008; **258 Suppl 5**:115-119.

5. Stansfeld S, Candy B. Psychosocial work environment and mental health--a meta-analytic review. *Scand J Work Environ Health* 2006; **32(6)**:443-462.

6. Karasek R, Brisson C, Kawakami N, Houtman I, Bongers P, Amick B. The Job Content Questionnaire (JCQ): an instrument for internationally comparative assessments of psychosocial job characteristics. *J Occup Health Psychol* 1998; **3(4)**:322-355.

7. Siegrist J, Starke D, Chandola T, Godin I, Marmot M, Niedhammer I*, et al.* The measurement of effort-reward imbalance at work: European comparisons. *Soc Sci Med* 2004; **58(8)**:1483-1499.

8. Loomis D, Wolf SH, Runyan CW, Marshall SW, Butts JD. Homicide on the job: workplace and community determinants. *Am J Epidemiol* 2001; **154(5)**:410-417.

9. Sbraga TP, O'Donohue W. Sexual harassment. *Annu Rev Sex Res* 2000; **11**:258-285.

10. Leymann H. The content and development of mobbing at work. *European journal of work and organizational psychology* 1996; **2**:165-184.

11. van der Hulst M. Long workhours and health. *Scand J Work Environ Health* 2003; **29(3)**:171-188.

12. Vaananen A, Koskinen A, Joensuu M, Kivimaki M, Vahtera J, Kouvonen A*, et al.* Lack of predictability at work and risk of acute myocardial infarction: an 18-year prospective study of industrial employees. *Am J Public Health* 2008; **98(12)**:2264-2271.

13. Pejtersen JH, Kristensen TS, Borg V, Bjorner JB. The second version of the Copenhagen Psychosocial Questionnaire. *Scand J Public Health* 2010; **38(3 Suppl)**:8-24.

14. Sverke M, Hellgren J, Naswall K. Job insecurity: A literature review. In. Stockholm, Sweden: National Institute for Working Life; 2006.

15. Lesuffleur T, Chastang JF, Sandret N, Niedhammer I. Psychosocial factors at work and sickness absence: Results from the French National SUMER Survey. *Am J Ind Med* 2014; **57(6)**:695-708.

16. Niedhammer I, Chastang JF, Gendrey L, David S, Degioanni S. Propriétés psychométriques de la version française des échelles de la demande psychologique, de la latitude décisionnelle et du soutien social du "Job Content Questionnaire" de Karasek : résultats de l'enquête nationale SUMER. *Santé Publique* 2006; **18(3)**:413-427.

17. Niedhammer I. Psychometric properties of the French version of the Karasek Job Content Questionnaire: a study of the scales of decision latitude, psychological demands, social support, and physical demands in the GAZEL cohort. *Int Arch Occup Environ Health* 2002; **75(3)**:129-144.

18. Niedhammer I, Siegrist J, Landre MF, Goldberg M, LeClerc A. [Psychometric properties of the French version of the Effort-Reward Imbalance model]. *Rev Epidemiol Sante Publique* 2000; **48(5)**:419-437.

19. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand* 1983; **67(6)**:361-370.

20. Stansfeld SA, Clark C, Caldwell T, Rodgers B, Power C. Psychosocial work characteristics and anxiety and depressive disorders in midlife: the effects of prior psychological distress. *Occup Environ Med* 2008; **65(9)**:634-642.

21. Murcia M, Chastang JF, Niedhammer I. Psychosocial work factors, major depressive and generalised anxiety disorders: Results from the French national SIP study. *J Affect Disord* 2013; **146(3)**:319-327.

22. Niedhammer I, Chastang JF, David S, Barouhiel L, Barrandon G. Psychosocial work environment and mental health: Job-strain and effort-reward imbalance models in a context of major organizational changes. *Int J Occup Environ Health* 2006; **12(2)**:111-119.

23. Wang J, Smailes E, Sareen J, Schmitz N, Fick G, Patten S. Three job-related stress models and depression: a population-based study. *Soc Psychiatry Psychiatr Epidemiol* 2012; **47(2)**:185-193.

24. Wang J, Patten SB, Currie S, Sareen J, Schmitz N. A population-based longitudinal study on work environmental factors and the risk of major depressive disorder. *Am J Epidemiol* 2012; **176(1)**:52-59.

25. Wang JL, Lesage A, Schmitz N, Drapeau A. The relationship between work stress and mental disorders in men and women: findings from a population-based study. *J Epidemiol Community Health* 2008; **62(1)**:42-47.

26. Niedhammer I, Chastang JF, Sultan-Taieb H, Vermeylen G, Parent-Thirion A. Psychosocial work factors and sickness absence in 31 countries in Europe. *Eur J Public Health* 2013; **23(4)**:622-629.

27. Rugulies R, Madsen IE, Hjarsbech PU, Hogh A, Borg V, Carneiro IG, *et al.* Bullying at work and onset of a major depressive episode among Danish female eldercare workers. *Scand J Work Environ Health* 2012; **38(3)**:218-227.

28. Niedhammer I, David S, Degioanni S, 143 occupational physicians. Association between workplace bullying and depressive symptoms in the French working population. *J Psychosom Res* 2006; **61(2)**:251-259.

29. Virtanen M, Ferrie JE, Singh-Manoux A, Shipley MJ, Stansfeld SA, Marmot MG, *et al.* Long working hours and symptoms of anxiety and depression: a 5-year follow-up of the Whitehall II study. *Psychol Med* 2011:1-10.

30. Burr H, Albertsen K, Rugulies R, Hannerz H. Do dimensions from the Copenhagen Psychosocial Questionnaire predict vitality and mental health over and above the job strain and effort-reward imbalance models? *Scand J Public Health* 2010; **38(3 Suppl)**:59-68.

Table 1. Description of the study sample

	Women (N= 20 079) N (%)	Men (N= 26 883) N (%)	P-value
Age (years)			**
<30	3926 (22)	5326 (23)	
30-39	5343 (26)	7539 (28)	
40-49	5821 (27)	7831 (27)	
50-59	4629 (22)	5782 (20)	
≥60	360 (2)	405 (2)	
Occupation			***
Professionals/managers	2811 (12)	5082 (17)	
Associate professionals/technicians	5666 (25)	6408 (22)	
Clerks/service workers	9311 (53)	3574 (17)	
Blue-collar workers	2291 (10)	11819 (43)	
Economic activities			***
Agriculture	255 (1)	960 (2)	
Industry	2669 (9)	7583 (22)	
Construction	267 (2)	1995 (11)	
Services	16888 (88)	16345 (65)	
Skill discretion			***
High	8310 (40)	14132 (53)	
Low	11729 (60)	12723 (47)	
Decision authority			***
High	6381 (32)	10316 (39)	
Low	13625 (68)	16528 (61)	
Decision latitude			***
High	8490 (42)	14121 (53)	
Low	11494 (58)	12709 (47)	
Psychological demands			NS
Low	10238 (54)	14460 (55)	
High	9746 (46)	12327 (45)	
Social support (colleague)			NS
High	12627 (65)	16920 (66)	
Low	6685 (35)	8792 (34)	
Social support (supervisor)			NS
High	11336 (58)	15121 (57)	
Low	8345 (42)	11376 (43)	
Social support			NS
High	10985 (58)	14544 (57)	
Low	8090 (42)	10976 (43)	
Job strain			***
Non-exposed	14410 (74)	21080 (79)	
Exposed	5517 (26)	5680 (21)	
Iso-strain			***
Non-exposed	15625 (83)	21851 (86)	

		Men	Women	
	Exposed	394 (17)	3612 (14)	
Esteem				***
	High	10800 (56)	13921 (54)	
	Low	8921 (44)	12638 (46)	
Job insecurity				NS
	Low	11224 (59)	14977 (59)	
	High	8062 (41)	11220 (41)	
Job promotion				NS
	High	11063 (58)	15161 (58)	
	Low	8623 (42)	11439 (42)	
Reward				NS
	High	9634 (50)	13002 (50)	
	Low	10117 (50)	13603 (50)	
Long working hours				***
	No	19195 (97)	24097 (91)	
	Yes (>48h/week)	734 (3)	2614 (9)	
Night work				***
	No	19356 (98)	24203 (94)	
	Yes (≥1 night/week)	558 (2)	2214 (6)	
Shift work				***
	No	16805 (85)	21261 (83)	
	Yes	3189 (15)	5492 (17)	
Unsociable work days				***
	No	16564 (83)	21178 (81)	
	Yes (≥1 day/week)	3503 (17)	5680 (19)	
Predictability				**
	High	14009 (69)	18049 (67)	
	Low	6017 (31)	8766 (33)	
Bullying				NS
	Non-exposed	15324 (78)	20881 (78)	
	Exposed	4755 (22)	6002 (22)	
Verbal abuse				***
	Non-exposed	14362 (74)	21208 (80)	
	Exposed	5375 (26)	5224 (20)	
Physical violence or sexual assault				NS
	Non-exposed	19112 (98)	25813 (98)	
	Exposed	375 (2)	402 (2)	
Demands for responsibility				***
	Low	13213 (68)	11388 (46)	
	High	6843 (32)	15574 (54)	
Depression symptoms (mean score, std)		4.34 (0.02)	4.50 (0.02)	***
Anxiety symptoms (mean score, std)		8.12 (0.03)	7.07 (0.02)	***

Comparison between men and women *: p<0.05; **: p<0.01; ***: p<0.001 (Rao-Scott Chi-Square test and Student t-test)
% based on weighted data

Table 2. Associations between psychosocial work factors and the two mental health outcomes: results from generalised linear models, each factor studied separately

Beta coefficient (95% CI)	Depression symptoms		Anxiety symptoms	
	Women	Men	Women	Men
Low skill discretion	**1.13 (1.00 ; 1.26)*****	**1.02 (0.90 ; 1.14)*****	**0.50 (0.34 ; 0.66)*****	**0.29 (0.15 ; 0.43)*****
Low decision authority	**1.06 (0.93 ; 1.19)*****	**1.07 (0.95 ; 1.18)*****	**0.84 (0.66 ; 1.01)*****	**0.49 (0.36 ; 0.63)*****
Low decision latitude	**1.32 (1.19 ; 1.45)*****	**1.24 (1.12 ; 1.36)*****	**0.77 (0.61 ; 0.93)*****	**0.58 (0.44 ; 0.72)*****
High psychological demands	**1.50 (1.38 ; 1.63)*****	**1.48 (1.36 ; 1.60)*****	**2.14 (1.99 ; 2.29)*****	**1.97 (1.84 ; 2.10)*****
Low social support (colleagues)	**0.94 (0.81 ; 1.07)*****	**0.99 (0.86 ; 1.11)*****	**0.60 (0.44 ; 0.76)*****	**0.63 (0.49 ; 0.78)*****
Low social support (supervisor)	**1.78 (1.65 ; 1.91)*****	**1.75 (1.64 -1.87)*****	**1.59 (1.43 ; 1.75)*****	**1.25 (1.11 ; 1.38)*****
Low social support	**1.90 (1.78 ; 2.03)*****	**1.86 (1.74 ; 1.98)*****	**1.54 (1.39 ; 1.70)*****	**1.33 (1.19 ; 1.46)*****
Jobstrain	**1.91 (1.77 ; 2.06)*****	**1.92 (1.76 ; 2.08)*****	**2.04 (1.87 ; 2.21)*****	**1.88 (1.71 ; 2.05)*****
Isostrain	**2.42 (2.25 ; 2.60)*****	**2.33 (2.15 ; 2.51)*****	**2.34 (2.15 ; 2.54)*****	**2.07 (1.87 ; 2.28)*****
Low esteem	**2.19 (2.06 ; 2.31)*****	**2.13 (2.02 ; 2.24)*****	**2.20 (2.05 ; 2.36)*****	**1.92 (1.79 ; 2.05)*****
Job insecurity	**1.42 (1.29 ; 1.55)*****	**1.67 (1.55 ; 1.80)*****	**1.68 (1.53 ; 1.84)*****	**1.66 (1.52 ; 1.79)*****
Low job promotion	**1.68 (1.55 ; 1.81)*****	**1.79 (1.67 ; 1.90)*****	**1.80 (1.64 ; 1.95)*****	**1.67 (1.54 ; 1.80)*****
Low reward	**1.94 (1.81 ; 2.06)*****	**2.08 (1.97 ; 2.19)*****	**2.06 (1.91 ; 2.21)*****	**1.90 (1.77 ; 2.03)*****
Long working hours	0.15 (-0.21 ; 0.51)	0.19 (-0.01 ; 0.38)	**0.48 (0.07 ; 0.89)***	**0.75 (0.53 ; 0.97)*****
Night work	0.20 (-0.18 ; 0.60)	-0.11 (-0.32 ; 0.09)	0.04 (-0.35 ; 0.43)	-0.16 (-0.39 ; 0.07)
Shift work	0.01 (-0.15 ; 0.18)	0.09 (-0.07 ; 0.24)	-0.13 (-0.34 ; 0.07)	-0.14 (-0.31 ; 0.03)
Unsociable work days	0.14 (-0.02 ; 0.31)	-0.05 (-0.18 ; 0.10)	0.06 (-0.13 ; 0.25)	-0.05 (-0.20 ; 0.11)
Low predictability	**0.18 (0.03 ; 0.33)***	**0.38 (0.26 ; 0.50)*****	**0.20 (0.02 ; 0.39)***	**0.50 (0.36 ; 0.63)*****
Bullying	**2.10 (1.95 ; 2.25)*****	**2.03 (1.89 ; 2.17)*****	**2.40 (2.21 ; 2.59)*****	**2.19 (2.02 ; 2.35)*****
Verbal abuse	**1.17 (1.03 ; 1.32)*****	**1.29 (1.14 ; 1.44)*****	**1.51 (1.32 ; 1.69)*****	**1.64 (1.47 ; 1.82)*****
Physical violence or sexual assault	0.17 (-0.29 ; 0.63)	**1.09 (0.63 ; 1.55)*****	**1.04 (0.45 ; 1.64)*****	**1.16 (0.67 ; 1.64)*****
Demands for responsibility	**0.28 (0.14 ; 0.41)*****	**0.30 (0.18 ; 0.42)*****	**0.47 (0.31 ; 0.63)*****	**0.48 (0.34 ; 0.61)*****

Adjusted for age, occupation and economic activity, and using weighted data
Bold beta significant at 5%
*: p<0.05; **: p<0.01; ***: p<0.001

Table 3. Associations between psychosocial work factors and the two mental health outcomes: results from generalised linear models, all factors (main dimensions) studied simultaneously

Beta coefficient (95% CI)	Depression symptoms Women N= 18 250	Men N= 24 648	Anxiety symptoms Women N= 18 255	Men N= 24 653
Low decision latitude	**0.80 (0.67 ; 0.92)***	**0.66 (0.54 ; 0.78)***	**0.26 (0.10 ; 0.42)**	**0.14 (0.01 ; 0.28)***
High psychological demands	**0.76 (0.63 ; 0.89)***	**0.70 (0.58 ; 0.83)***	**1.40 (1.24 ; 1.56)***	**1.27 (1.14 ; 1.40)***
Low social support	**0.82 (0.68 ; 0.96)***	**0.86 (0.73 ; 0.99)***	**0.26 (0.09 ; 0.42)**	**0.25 (0.11 ; 0.39)***
Low reward	**0.96 (0.82 ; 1.09)***	**1.14 (1.01 ; 1.27)***	**1.05 (0.88 ; 1.21)***	**1.03 (0.89 ; 1.17)***
Long working hours	0.05 (-0.25 ; 0.35)	0.02 (-0.17 ; 0.22)	0.15 (-0.32 ; 0.61)	**0.48 (0.27 ; 0.69)***
Low predictability	-0.05 (-0.19 ; 0.08)	**0.12 (0.01 ; 0.24)***	-0.03 (-0.20 ; 0.15)	**0.19 (0.06 ; 0.32)**
Bullying	**1.06 (0.89 ; 1.22)***	**0.93 (0.78 ; 1.08)***	**1.34 (1.14 ; 1.54)***	**1.15 (0.99 ; 1.32)***
Verbal abuse	**0.36 (0.21 ; 0.51)***	**0.32 (0.17 ; 0.47)***	**0.58 (0.39 ; 0.77)***	**0.69 (0.52 ; 0.86)***
Physical violence or sexual assault	**-0.70 (-1.12 ; -0.29)**	0.32 (-0.14 ; 0.77)	-0.16 (-0.73 ; 0.41)	0.09 (-0.41 ; 0.59)
Demands for responsibility	0.08 (-0.05 ; 0.21)	0.02 (-0.09 ; 0.14)	0.12 (-0.03 ; 0.28)	0.11 (-0.02 ; 0.25)

Adjusted for age, occupation and economic activity, and using weighted data
Bold beta significant at 5%
*: $p<0.05$; **: $p<0.01$; ***: $p<0.001$

Table 4. Associations between psychosocial work factors and the two mental health outcomes: results from generalised linear models, all factors (sub-dimensions) studied simultaneously

Beta coefficient (95% CI)	Depression symptoms Women N= 17 725	Men N= 24 237	Anxiety symptoms Women N= 17 727	Men N= 24 242
Low skill discretion	**0.58 (0.45 ; 0.71)*****	**0.38 (0.24 ; 0.51)*****	0.07 (-0.09 ; 0.24)	-0.11 (-0.25 ; 0.03)
Low decision authority	**0.39 (0.26 ; 0.52)*****	**0.45 (0.33 ; 0.57)*****	**0.31 (0.13 ; 0.48)*****	**0.14 (0.01 ; 0.28)***
High psychological demands	**0.69 (0.56 ; 0.82)*****	**0.62 (0.48 ; 0.76)*****	**1.32 (1.15 ; 1.48)*****	**1.17 (1.03 ; 1.31)*****
Low social support (supervisor)	**0.35 (0.20 ; 0.50)*****	**0.46 (0.33 ; 0.59)*****	0.05 (-0.11 ; 0.23)	-0.02 (-0.16 ; 0.12)
Low social support (colleagues)	**0.31 (0.19 ; 0.44)*****	**0.37 (0.24 ; 0.49)*****	0.09 (-0.08 ; 0.25)	**0.20 (0.06 ; 0.34)****
Low esteem	**0.90 (0.73 ; 1.06)*****	**0.91 (0.77 ; 1.04)*****	**0.80 (0.62 ; 0.98)*****	**0.71 (0.56 ; 0.86)*****
Job insecurity	**0.31 (0.17 ; 0.46)*****	**0.50 (0.34 ; 0.66)*****	**0.62 (0.45 ; 0.79)*****	**0.66 (0.49 ; 0.82)*****
Low job promotion	**0.48 (0.33 ; 0.64)*****	**0.39 (0.24 ; 0.53)*****	**0.37 (0.20 ; 0.55)*****	**0.37 (0.21 ; 0.53)*****
Long working hours	-0.04 (-0.36 ; 0.29)	0.08 (-0.11 ; 0.27)	0.11 (-0.33 ; 0.55)	**0.54 (0.33 ; 0.75)*****
Low predictability	-0.04 (-0.17 ; 0.10)	**0.12 (0.00 ; 0.23)***	-0.02 (-0.20 ; 0.15)	**0.19 (0.06 ; 0.32)****
Bullying	**0.98 (0.81 ; 1.15)*****	**0.88 (0.73 ; 1.03)*****	**1.24 (1.03 ; 1.44)*****	**1.07 (0.91 ; 1.24)*****
Verbal abuse	**0.32 (0.17 ; 0.47)*****	**0.30 (0.15 ; 0.45)*****	**0.52 (0.33 ; 0.70)*****	**0.66 (0.49 ; 0.83)*****
Physical violence or sexual assault	**-0.83 (-1.28 ; -0.38)****	0.35 (-0.09 ; 0.80)	-0.21 (-0.76 ; 0.33)	0.10 (-0.40 ; 0.60)
Demands for responsibility	0.08 (-0.04 ; 0.21)	0.02 (-0.09 ; 0.14)	0.10 (-0.05 ; 0.26)	0.11 (-0.03 ; 0.24)

Adjusted for age, occupation and economic activity, and using weighted data
Bold beta significant at 5%
*: p<0.05; **: p<0.01; ***: p<0.001