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# Classic and emergent psychosocial work factors and mental health

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| **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 national cross-sectional study (the SUrveillance Médicale des Expositions aux Risques professionnels (SUMER) survey) assessed 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 and sexual assault, long working hours, shift and night work, unsociable work days, predictability and demands for responsibility. We also measured depression and anxiety symptoms using the Hospital Anxiety and Depression scale. We used gender-stratified generalized linear models to adjust for age, occupation and economic activity. |
| **Results** | A total of 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 (β coefficients from 0.14 to 1.40). In men, low predictability was associated with both depression and anxiety (β = 0.12 [95% confidence interval (CI) 0.01, 0.24] and 0.19 [95% CI 0.06, 0.32]) and long working hours were associated with anxiety (β = 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 health symptoms. |
| **Conclusions** | 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. |
| **Key words** | Anxiety symptoms; depression symptoms; France; HAD scale; psychosocial work factors. |

## 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 sub-scales, 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 provision, including periodical medical examinations, is mandatory for all employees in France. The 2010 SUMER survey included a questionnaire completed by 2400 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 have 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 (six items for skill discretion and three items for decision authority), psychological demands (nine items) and social support (four items for colleague support and four items for supervisor support). The internal consistency of these scales was satisfactory (Cronbach's α: 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 dichotomized 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 α: 0.85, including five items for esteem, two items for job security and four items for job promotion) from the effort–reward imbalance model using the validated French version of this scale [18]. We dichotomized reward and its sub-dimensions at the median of the total sample.

We studied five working time variables: long working hours (≥48 h/week following the European directive on working time, one item), night work (working between 12 and 5 a.m. ≥1 night/week, one item), shift work (either permanent or alternating/rotating shifts, one item), unsociable work days (working on Sunday or Saturday ≥1 day/week, one item) and predictability (four items: information about time schedules for the next day, week, month and the next 3 months).

We derived three factors related to workplace violence from Leymann's questionnaire: bullying (nine items), verbal abuse (two items) and physical violence or sexual assault (two items) [10]. We defined exposure as at least one situation of workplace violence.

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 dichotomized them at the median of the total sample.

We studied the main dimensions of these psychosocial work factors, as well as the sub-dimensions, that is, 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 sub-scale; seven items) and depression symptoms (HAD-D sub-scale; seven items) separately, each sub-scale 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, and economic activity of the employer, coded using the European classification of economic activities.

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 generalized 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 colinearity 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

Of the 53 940 employees asked to participate, 26 883 men and 20 079 women responded to the main and self-administered questionnaires, a response rate of 87%. Table 1 presents a description of the sample. 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, whereas 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

**Table 1.** Description of the study sample

| | Women ($n$ = 20 079), $n$ (%) | Men ($n$ = 26 883), $n$ (%) | $P$ |
|---|---|---|---|
| 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) | 11 819 (44) | |
| Economic activities | | | *** |
| Agriculture | 255 (1) | 960 (2) | |
| Industry | 2669 (9) | 7583 (22) | |
| Construction | 267 (2) | 1995 (11) | |
| Services | 16 888 (88) | 16 345 (65) | |
| Skill discretion | | | *** |
| High | 8310 (40) | 14 132 (53) | |
| Low | 11 729 (60) | 12 723 (47) | |
| Decision authority | | | *** |
| High | 6381 (32) | 10 316 (39) | |
| Low | 13 625 (68) | 16 528 (61) | |
| Decision latitude | | | *** |
| High | 8490 (42) | 14 121 (53) | |
| Low | 11 494 (58) | 12 709 (47) | |
| Psychological demands | | | NS |
| Low | 10 238 (54) | 14 460 (55) | |
| High | 9746 (46) | 12 327 (45) | |

**Table 1.** Continued

| | Women ($n$ = 20 079), $n$ (%) | Men ($n$ = 26 883), $n$ (%) | $P$ |
|---|---|---|---|
| Social support (colleague) | | | NS |
| High | 12 627 (65) | 16 920 (66) | |
| Low | 6685 (35) | 8792 (34) | |
| Social support (supervisor) | | | NS |
| High | 11 336 (58) | 15 121 (57) | |
| Low | 8345 (42) | 11 376 (43) | |
| Social support | | | NS |
| High | 10 985 (58) | 14 544 (57) | |
| Low | 8090 (42) | 10 976 (43) | |
| Job strain | | | *** |
| Non-exposed | 14 410 (74) | 21 080 (79) | |
| Exposed | 5517 (26) | 5680 (21) | |
| Iso-strain | | | *** |
| Non-exposed | 15 625 (83) | 21 851 (86) | |
| Exposed | 394 (17) | 3612 (14) | |
| Esteem | | | *** |
| High | 10 800 (56) | 13 921 (54) | |
| Low | 8921 (44) | 12 638 (46) | |
| Job insecurity | | | NS |
| Low | 11 224 (59) | 14 977 (59) | |
| High | 8062 (41) | 11 220 (41) | |
| Job promotion | | | NS |
| High | 11 063 (58) | 15 161 (58) | |
| Low | 8623 (42) | 11 439 (42) | |
| Reward | | | NS |
| High | 9634 (50) | 13 002 (50) | |
| Low | 10 117 (50) | 13 603 (50) | |
| Long working hours | | | *** |
| No | 19 195 (97) | 24 097 (91) | |
| Yes (>48 h/week) | 734 (3) | 2614 (9) | |
| Night work | | | *** |
| No | 19 356 (98) | 24 203 (94) | |
| Yes (≥1 night/week) | 558 (2) | 2214 (6) | |
| Shift work | | | *** |
| No | 16 805 (85) | 21 261 (83) | |
| Yes | 3189 (15) | 5492 (17) | |
| Unsociable work days | | | *** |
| No | 16 564 (83) | 21 178 (81) | |
| Yes (≥1 day/week) | 3503 (17) | 5680 (19) | |
| Predictability | | | ** |
| High | 14 009 (69) | 18 049 (67) | |
| Low | 6017 (31) | 8766 (33) | |
| Bullying | | | NS |
| Non-exposed | 15 324 (78) | 20 881 (78) | |
| Exposed | 4755 (22) | 6002 (22) | |
| Verbal abuse | | | *** |
| Non-exposed | 14 362 (74) | 21 208 (80) | |
| Exposed | 5375 (26) | 5224 (20) | |
| Physical violence or sexual assault | | | NS |
| Non-exposed | 19 112 (98) | 25 813 (98) | |
| Exposed | 375 (2) | 402 (2) | |
| Demands for responsibility | | | *** |
| Low | 13 213 (68) | 11 388 (46) | |
| High | 6843 (32) | 15 574 (54) | |
| Depression symptoms (mean score, standard deviation) | 4.34 (0.02) | 4.50 (0.02) | *** |
| Anxiety symptoms (mean score, standard deviation) | 8.12 (0.03) | 7.07 (0.02) | *** |

NS, not significant.
% based on weighted data.
Comparison between men and women *$P$ < 0.05; **$P$ < 0.01; ***$P$ < 0.001 (Rao–Scott Chi-square test and Student's $t$-test).

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

| β 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)*** ** |
| Job strain | **1.91 (1.77, 2.06)*** ** | **1.92 (1.76, 2.08)*** ** | **2.04 (1.87, 2.21)*** ** | **1.88 (1.71, 2.05)*** ** |
| Iso-strain | **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 β 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 generalized linear models, all factors (main dimensions) studied simultaneously

| β Coefficient (95% CI) | Depression symptoms | | Anxiety symptoms | |
|---|---|---|---|---|
| | Women, $n$ = 18 250 | Men, $n$ = 24 648 | 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 β significant at 5%.
*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

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 a 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 iso-strain (as an independent variable) were also associated with depression and anxiety.

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

| β Coefficient (95% CI) | Depression symptoms | | Anxiety symptoms | |
|---|---|---|---|---|
| | Women, *n* = 17 725 | Men, *n* = 24 237 | 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 β significant at 5%.
*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

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 health 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 and 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 sub-clinical 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 weakly or not 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 and 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 not only 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.

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## Conflicts of interest

None declared.

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# Jaw ache – an occupational hazard?

Temporomandibular joint (TMJ) dysfunction is extremely common. The main features are discomfort or pain on opening the mouth and chewing. There may be associated clicking of the joint. The symptoms are commonly unilateral. The causes of TMJ dysfunction are numerous but are often dentally related. An asymmetric bite resulting in jaw ache can stem from a single tooth abscess, dental malocclusion or even unilateral sinusitis. Habitual chewers of chewing gum are obvious candidates for TMJ pain. Stress, in the widest sense, often underlies the painful symptoms. Nocturnal bruxism can be so prominent that the grinding of one's teeth in one's sleep can wake up a partner and in chronic cases causes wear of the occlusal surfaces of molar teeth. Sufferers often think that their symptoms stem from the ear and therefore seek advice from their doctor rather than their dentist. As a result, the patient may be referred to an ENT surgeon or even a neurologist. Eventually, however, TMJ sufferers will find their way to a dentist and it is one of the most common problems that ends up in the outpatient department of a maxillo-facial surgeon.

During my career as a consultant maxillo-facial surgeon, I recall two particularly interesting cases of TMJ dysfunction where understanding the patient's occupation was key to finding a cause and a cure. The first was a secretary who had the usual symptoms of TMJ dysfunction. Careful questioning about her work revealed that she often answered her telephone and continued typing whilst anchoring her phone between her ear and her neck. Problem solved.

The second case was unique for me in over 30 years of clinical practice as a specialist. The patient was a wealthy local farmer. He was middle aged and well adjusted. He had severe pain in his right TMJ. All the usual causes were excluded. After much head scratching, I asked him to give me a detailed account of his daily routine. It transpired that although he had numerous employees, he loved going out on his tractor to work the land. Whilst doing so, he habitually sucked on his pipe which he clenched between his teeth on the left side. I suggested that he should clench his pipe on the opposite side on alternate days. That cured his TMJ pain.

As Ramazzini said, 'When a doctor arrives to attend some patient of the working class … let him condescend to sit down … if not on a gilded chair … on a three-legged stool … He should question the patient carefully … So says Hippocrates in his work *Affections*. I may venture to add one more question: What occupation does he follow?' It is true, even in the world of maxillo-facial surgery!

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