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Research paper

# The associations of psychosocial work exposures with suicidal ideation in the national French SUMER study

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## ABSTRACT

**Background:** The literature remains scarce on the work-related risk factors for suicide and suicidal ideation. The objectives were to explore the associations of psychosocial work exposures with suicidal ideation in a nationally representative sample of the working population.

**Methods:** The study was based on the sample of 25,977 employees (14,682 men and 11,295 women) of the national French 2016–17 SUMER survey. The outcome was suicidal ideation assessed using the PHQ-9 instrument. Psychosocial work exposures included various factors from the job strain and effort-reward imbalance models, and other concepts. Statistical analyses were performed using weighted methods, including weighted logistic regression models. Other occupational exposures and covariates were considered. Gender differences were tested.

**Results:** The prevalence of suicidal ideation was 3.5 % without any difference between genders. Psychosocial work exposures were found to be associated with suicidal ideation. The strongest association was observed between workplace bullying and suicidal ideation. Associations were also found between job strain model factors, job insecurity, low esteem, work-family conflict, ethical conflict, teleworking, and low meaning, and suicidal ideation. The associations were in general similar for men and women.

**Limitations:** The study had a cross-sectional design and no causal interpretation could be done. A reporting bias and a healthy worker effect may be suspected.

**Conclusion:** Psychosocial work exposures played a major role in suicidal ideation. More research may be needed to confirm our results, as suicidal ideation is an important warning signal for suicide prevention. More primary prevention towards the psychosocial work environment may be useful to reduce suicidal ideation at the workplace.

## 1. Introduction

Since the publication of the book by the French sociologist Durkheim (Durkheim, 1897), social factors have been studied in addition to personal factors as risk factors for suicide. More recently, France was placed at the centre of the international media attention by the clusters of suicide cases observed in some very large companies, pointing out the potential role of deleterious management practices and business strategies (Chabrak et al., 2016). In the wake of France, other countries were confronted with similar suicide epidemic. However, the scientific evidence remains scarce to identify work-related risk factors for suicide precisely, leading some authors to consider that the research in the field

of work-related factors, and particularly psychosocial work factors, in association with suicide behaviour was still “in its infancy” (Greiner and Arensman, 2022). The development of the research on the work-related risk factors for suicide behaviour would also be very useful to better understand the differences observed in suicide risk according to occupations (Milner et al., 2013).

Psychosocial work exposures include a large set of factors related to various social, psychological, and organisational aspects of the work environment. Theoretical models have been elaborated to focus on major factors. The main model is certainly the job strain model by Karasek (Karasek et al., 1998) that defined three main factors: decision latitude (with the subdimensions of skill discretion and decision

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authority), psychological demands, and social support (with the sub-dimensions of social support from supervisor and social support from colleagues). According to Karasek, the combination of low decision latitude and high psychological demands, called job strain, is considered as the most deleterious situation at the workplace. Since the elaboration of the job strain model, other models and concepts of psychosocial work exposures have been developed, allowing the study of various aspects of the psychosocial work environment. Psychosocial work exposures have been found to be risk factors for health outcomes, especially mental health outcomes (Niedhammer et al., 2021). In particular, literature reviews (Kim and von dem Knesebeck, 2016; Madsen et al., 2017; Ronnblad et al., 2019; Rudkjoebing et al., 2020; Rugulies et al., 2017; Theorell et al., 2015; Virtanen et al., 2018; Wong et al., 2019) underlined the associations between some of these exposures and depression, recognized as a risk factor for suicide. The literature is much sparser on the associations between psychosocial work exposures and suicide, suicidal behaviour, and suicidal ideation.

Three systematic reviews of the literature were published on the associations between psychosocial work exposures and suicidal ideation (Leach et al., 2017; Luo et al., 2023; Milner et al., 2018). The review by Leach et al. (Leach et al., 2017) reported that most of the included studies showed an association between workplace bullying and suicidal ideation/thoughts (8 among 12 studies). Luo et al. (Luo et al., 2023) updated this review and provided results from a meta-analysis of 15 studies: people exposed to workplace bullying had 2-times higher odds of suicidal ideation than non-exposed people. The review by Milner et al. (Milner et al., 2018) including a meta-analysis, showed that the factors of the job strain model, effort-reward imbalance, and job insecurity were associated with suicidal ideation. However, the number of studies was low in these three reviews and the authors concluded to a lack of high-quality studies and the need for more research on this topic.

The objectives of the study were to examine the associations between psychosocial work exposures and suicidal ideation. The study was an attempt to overcome the limitations observed in the existing literature by the exploration of a large nationally representative study sample, of both men and women and gender differences, and of a large set of psychosocial work exposures, and by a careful consideration of covariates and of other occupational exposures.

## 2. Methods

### 2.1. Study sample

The study relied on the data of the national French 2016–17 survey called SUMER (SURveillance Médicale des Expositions aux Risques professionnels). This periodical cross-sectional survey is conducted by DARES of the French ministry of labour every 7 years. The survey aims at providing up-to-date information about occupational exposures among the national French population of employees. The data are collected by a large network of occupational physicians on a randomly selected sample of employees who respond to both a questionnaire asked by their occupational physician and a self-administered questionnaire. Ethical approval was obtained by national ethics committees. We published a large number of studies using the data from the SUMER survey and the full list of these publications can be found in the Supplementary Material.

### 2.2. Suicidal ideation

Suicidal ideation was measured in the self-administered questionnaire using one item from the PHQ-9 instrument (including 9 items) designed to detect depression (Kroenke et al., 2001). Among the 9 items of the PHQ-9 instrument, we used the 9th item to measure suicidal ideation, which is the following: “Over the last 2 weeks, how often have you been bothered by any of the following problems? [...] Thoughts that you would be better off dead or of hurting yourself in some way”. The

response categories are: not at all, several days, more than half the days, and nearly every day. Following the recommended use of the PHQ-9 instrument, suicidal ideation was defined by a frequency of several days or more over the last 2 weeks.

### 2.3. Psychosocial work exposures

Psychosocial work exposures were measured using various validated questionnaires and additional items. The validated French questionnaire of the job strain model (JCQ – Job Content Questionnaire) (Karasek et al., 1998; Niedhammer, 2002; Niedhammer et al., 2006) was used to measure: psychological demands, decision latitude (including two sub-dimensions: skill discretion and decision authority), and social support at work (including two sub-dimensions: social support from supervisor and social support from colleagues). These variables were dichotomised at the median of the study sample. Job strain was defined by low levels of decision latitude and high levels of psychological demands, and the four following job situations were constructed: low strain, high strain, passive job, and active job according to the low/high levels of decision latitude and psychological demands. The validated French questionnaire of reward from the effort-reward imbalance model (Niedhammer et al., 2000b; Siegrist et al., 2004) was used to measure reward and its three sub-dimensions: esteem, job promotion, and job security. These variables were dichotomised at the median of the study sample. Various items were used to measure three aspects of workplace violence: workplace bullying (9 items), verbal aggression (2 items) and physical/sexual aggression (2 items). The exposure was defined by a positive response to one of the items. Work-family conflict, ethical conflict, temporary work (temporary contract), teleworking (at least one day/week), and meaning of work were measured using one item each. Lean management was measured using four items and defined by at least one exposure among just-in-time production, quality improvement, employee involvement, and eliminating wasteful activities.

### 2.4. Other occupational exposures

Three factors related to working time/hours were measured: long working hours (>48 h/week), shift work (permanent or alternating/rotating shifts), and night work (one night or more/week between 12 and 5 a.m.).

Physical, biomechanical, chemical, and biological exposures were also measured. Physical exposure included the exposure to noise, thermic constraints, radiations or controlled air/space. Biomechanical exposure included the exposure to manual materials handling, postural/articular constraints, repetition, vibration or driving. The threshold used to define the exposure was at least 20 h of exposure within the previous week. Chemical and biological exposures were defined by at least one exposure within the previous week. Details for the construction of all these variables are available elsewhere (Niedhammer et al., 2008).

### 2.5. Covariates

The following variables were used as covariates: gender, age, marital status, occupation, and economic activity of the company.

### 2.6. Statistical analyses

All the statistical analyses were done using R software and using weighted data to provide results that could be extrapolated to the national population of employees. Weights, calculated by DARES of the French ministry of labour, had the following objectives: (1) to control for the potential bias related to non-response of occupational physicians and employees to the survey, (2) to control for the potential bias related to the periodicity of occupational health examinations (the more exposed the employees, the more frequent the occupational health examinations), and (3) to perform a calibration on margins using the

following variables: gender, age, nationality, full/part time work, occupation, company size, and economic activity of the company. Indeed, using these weighted data, the survey data were representative of 24.5 million employees in France. A description of the study sample was done for all studied variables and genders differences were tested using the Rao-Scott Chi-Square test. The associations between psychosocial work exposures and suicidal ideation were studied using weighted logistic regression models with adjustment for covariates. The following models were performed: (1) each psychosocial work exposure was included separately, i.e. one by one, in Models 0, (2) all psychosocial work exposures were included simultaneously in Model 1, (3) working time/hours were included as additional variables in Model 2, and (4) the other occupational exposures were included as additional variables in Model 3. A final model included all significant psychosocial work exposures as well as covariates. We studied both the dimensions and subdimensions of psychosocial work exposures using this final model. Gender-related interactions were tested to study the differences in the associations between psychosocial work exposures and suicidal ideation between genders. Job strain according to the definition by Karasek (i.e. combination of high psychological demands and low decision latitude) and the four job situations by Karasek (high strain i.e. high demands and low latitude, active job i.e. high demands and high latitude, passive job i.e. low demands and low latitude, and low strain i.e. low demands and high latitude, as reference) were also studied.

### 2.7. Sensitivity analyses

The following sensitivity analyses were performed to evaluate the robustness of the results: (1) the analyses were redone on the subsample of the employees working full time only, and (2) additional adjustment for private/public sector, company size, and the presence of chronic diseases was performed.

## 3. Results

### 3.1. Description of the study sample

In 2016–17, 30,000 employees were asked to participate to the SUMER survey. The number of participants was 26,494 (participation rate of 88.3 %). Among them, 25,977 filled in the self-administered questionnaire (response rate of 86.6 %). Consequently, the study sample included 25,977 employees, with 14,682 men and 11,295 women. The description of all studied variables among the study sample is presented in Table 1. The prevalence of suicidal ideation was 3.5 %, without any difference between genders. Most psychosocial work exposures, working time/hours and other occupational exposures displayed significant gender differences. There were also significant differences in the covariates (except marital status) between genders.

### 3.2. Associations between covariates and suicidal ideation

Significant associations were found between covariates and suicidal ideation when each covariate was studied separately with the outcome. The prevalence of suicidal ideation increased with age ( $p < 0.001$ ), among employees living alone ( $p < 0.001$ ), and among low-skilled employees (i.e. blue collar workers and clerks/service workers,  $p < 0.05$ ).

### 3.3. Associations between other occupational exposures and suicidal ideation

None of the working time/hours and other occupational exposures, when studied separately, was found as risk factor for suicidal ideation, after adjustment for covariates (gender, age, marital status, occupation, and economic activity of the company) (Table 2, Models 0).

### 3.4. Associations between psychosocial work exposures and suicidal ideation

The associations of psychosocial work exposures and suicidal ideation are presented in Table 2. In the models in which each psychosocial work exposure was studied separately with adjustment for covariates (gender, age, marital status, occupation, and economic activity of the company) (Models 0), all psychosocial work exposures were associated with suicidal ideation, except lean management. In Models 1, 2, and 3 in which all psychosocial work exposures were included simultaneously, low decision latitude, high psychological demands, low social support, low reward, bullying, work-family conflict, ethical conflict, teleworking and low meaning were associated with suicidal ideation. These associations were confirmed in the final model (Table 3). The association with the highest magnitude was found between bullying and suicidal ideation. There was no gender-related interactions in these associations. The study of the subdimensions of psychosocial work exposures (Table 4) showed that high psychological demands, low support from colleagues, low esteem, low job security, bullying, work-family conflict, ethical conflict, teleworking, and low meaning were associated with suicidal ideation. The only significant gender-related interaction was the interaction between gender and low support from colleagues and showed that the association between low support from colleague and suicidal ideation was significant among women (OR = 1.95, 95 % CI: 1.36–2.78) and not significant among men (OR = 0.98, 95 % CI: 0.68–1.43). All the results of the interaction tests between gender and psychosocial work exposures can be found in Supplementary Table S1. The association between job strain (i.e. combination of high psychological demands and low decision latitude) and suicidal ideation was significant among the whole study sample (OR = 1.51, 95 % CI: 1.17–1.96). The interaction between gender and job strain was borderline significant ( $p = 0.097$ ) and suggested that the association between job strain and suicidal ideation was significant among men only (OR = 1.87, 95 % CI: 1.30–2.69 among men, and OR = 1.22, 95 % CI: 0.87–1.71 among women). The results of the associations of the four job situations by Karasek with suicidal ideation are shown for men and women separately in Figs. 1–2. Only high strain (OR = 2.89, 95 % CI: 1.59–5.25) and active job (OR = 1.89, 95 % CI: 1.05–3.41) were significantly associated with suicidal ideation among men.

### 3.5. Sensitivity analyses

The results of the sensitivity analyses provided similar results compared to the main analyses (Supplementary Tables S2–S5).

## 4. Discussion

### 4.1. Main results

Our study focused on the associations between occupational exposures, especially psychosocial work exposures, and suicidal ideation in a nationally representative sample of employees. The results showed that the exposures significantly associated with suicidal ideation were those related to the psychosocial work environment. The exposures related to working time/hours and other occupational exposures of physical, biomechanical, chemical, and biological nature were not associated with suicidal ideation. Various psychosocial work exposures were found to be associated with suicidal ideation, and the association with the highest magnitude was found between workplace bullying and suicidal ideation. Only some seldom gender-related interactions were observed suggesting that most associations were similar for men and women.

### 4.2. Comparison with the literature

To make our comparison with the literature more pertinent, only studies exploring general working populations were used (studies based

**Table 1**  
Description of all studied variables among the whole study sample and among men and women separately.

	All (N = 25,977) n (w%)	Men (N = 14,682) n (w%)	Women (N = 11,295) n (w%)	P-value
Suicidal ideation	992 (3.54 %)	527 (3.50 %)	465 (3.59 %)	0.814
Psychosocial work exposures				
Low skill discretion	13,174 (53.17 %)	6937 (49.09 %)	6237 (57.36 %)	<0.001
Low decision authority	15,573 (61.04 %)	8481 (59.24 %)	7092 (62.88 %)	<0.001
Low decision latitude	12,614 (51.03 %)	6638 (47.88 %)	5976 (54.28 %)	<0.001
High psychological demands	12,888 (46.11 %)	7013 (44.96 %)	5875 (47.29 %)	0.039
Low supervisor support	10,135 (38.59 %)	5642 (38.37 %)	4493 (38.81 %)	0.693
Low colleague support	15,727 (60.37 %)	8949 (61.41 %)	6778 (59.28 %)	0.058
Low social support	9869 (38.08 %)	5547 (38.35 %)	4322 (37.81 %)	0.632
Low esteem	13,648 (51.41 %)	7896 (53.55 %)	5752 (49.20 %)	<0.001
Low job promotion	12,946 (48.15 %)	7064 (46.42 %)	5882 (49.93 %)	0.002
Low job security	9128 (35.02 %)	5340 (36.64 %)	3788 (33.34 %)	0.004
Low reward	12,262 (46.37 %)	6800 (45.55 %)	5462 (47.23 %)	0.144
Bullying	4183 (15.96 %)	2207 (15.69 %)	1976 (16.22 %)	0.530
Verbal aggression	4718 (18.35 %)	2246 (15.91 %)	2472 (20.85 %)	<0.001
Physical/sexual aggression	415 (1.68 %)	222 (1.57 %)	193 (1.78 %)	0.446
Work-family conflict	9745 (37.06 %)	5576 (37.36 %)	4169 (36.75 %)	0.571
Ethical conflict	8434 (31.89 %)	4846 (33.35 %)	3588 (30.39 %)	0.005
Temporary work	1623 (11.12 %)	867 (11.94 %)	756 (10.28 %)	0.087
Teleworking	888 (3.09 %)	523 (3.25 %)	365 (2.92 %)	0.356
Lean management	11,357 (36.87 %)	7167 (40.79 %)	4190 (32.85 %)	<0.001
Low meaning	15,847 (60.83 %)	9297 (63.52 %)	6550 (58.08 %)	<0.001
Working time/hours				
Long working hours	2078 (6.44 %)	1503 (8.87 %)	575 (3.96 %)	<0.001
Shift work	4205 (14.15 %)	2756 (15.71 %)	1449 (12.55 %)	<0.001
Night work	1721 (4.67 %)	1363 (6.93 %)	358 (2.36 %)	<0.001
Other occupational exposures				
Physical exposure (all)	3303 (12.45 %)	2481 (17.78 %)	822 (7.01 %)	<0.001
Physical exposure (noise)	1860 (7.19 %)	1296 (9.28 %)	564 (5.05 %)	<0.001
Physical exposure (temperature)	1675 (6.49 %)	1446 (10.91 %)	229 (1.99 %)	<0.001
Physical exposure (radiations)	190 (0.40 %)	152 (0.62 %)	38 (0.18 %)	<0.001
Physical exposure (controlled air/space)	253 (0.69 %)	153 (0.82 %)	100 (0.56 %)	0.106
Biomechanical exposure (all)	8462 (34.61 %)	5075 (38.05 %)	3387 (31.10 %)	<0.001
Biomechanical exposure (manual material handling)	945 (4.28 %)	685 (6.37 %)	260 (2.16 %)	<0.001
Biomechanical exposure (posture)	7750 (31.69 %)	4485 (33.29 %)	3265 (30.06 %)	0.003
Biomechanical exposure (repetition)	822 (3.98 %)	449 (4.24 %)	373 (3.72 %)	0.279
Biomechanical exposure (vibration)	675 (2.27 %)	625 (4.24 %)	50 (0.27 %)	<0.001
Biomechanical exposure (driving)	1149 (4.36 %)	1020 (7.83 %)	129 (0.82 %)	<0.001
Chemical exposure	7300 (32.23 %)	4645 (35.68 %)	2655 (28.71 %)	<0.001
Biological exposure	5296 (24.95 %)	2258 (18.45 %)	3038 (31.59 %)	<0.001
Covariates				
Age (years)				<0.001
<30	3306 (17.54 %)	1949 (19.02 %)	1357 (16.04 %)	
[30–39]	6507 (24.13 %)	3793 (24.96 %)	2714 (23.29 %)	
[40–49]	7805 (26.96 %)	4378 (26.08 %)	3427 (27.85 %)	
≥50	8359 (31.37 %)	4562 (29.94 %)	3797 (32.82 %)	
Marital status				0.127
In couple	18,601 (69.65 %)	10,785 (70.46 %)	7816 (68.83 %)	
Alone	6966 (30.35 %)	3647 (29.54 %)	3319 (31.17 %)	
Occupation (4 groups)				<0.001
Managers/professionals	5883 (16.86 %)	3693 (19.67 %)	2190 (13.99 %)	
Associate professionals/technicians	7557 (20.31 %)	4136 (18.80 %)	3421 (21.86 %)	
Clerks/service workers	6419 (35.97 %)	1819 (18.79 %)	4600 (53.53 %)	
Blue collar workers	6118 (26.85 %)	5034 (42.74 %)	1084 (10.63 %)	
Economic activity (4 groups)				<0.001
Agriculture	485 (1.28 %)	370 (1.79 %)	115 (0.76 %)	
Manufacturing	5306 (12.85 %)	3986 (18.09 %)	1320 (7.51 %)	
Construction	1366 (5.57 %)	1153 (9.16 %)	213 (1.91 %)	
Services	18,820 (80.30 %)	9173 (70.97 %)	9647 (89.83 %)	

n (w%): unweighted number (weighted %).

P-value for the comparison between genders (Rao-Scott Chi<sup>2</sup> test).

on specific occupational groups or sectors were not considered). One of our main findings was that the exposures associated with suicidal ideation were psychosocial work exposures. This finding is consistent with the expectations, and in accordance with the literature underlining the health effects of psychosocial work exposures on mental health outcomes (Niedhammer et al., 2021). The absence of associations between the other occupational exposures and suicidal ideation brought

plausibility to our results. The strongest association found in our study was between workplace bullying and suicidal ideation with an odds-ratio of 2.5. This result is perfectly consistent with the literature and with the finding of the recent review and meta-analysis by Luo et al. (Luo et al., 2023) who reported a pooled estimate of 2. The well-known factors of the job strain model were found to be associated with suicidal ideation in our study, in agreement with the literature review and

**Table 2**

Associations of psychosocial work exposures and other occupational exposures with suicidal ideation according to various weighted logistic regression models.

	Models 0	Model 1 (N = 23,702)	Model 2 (N = 23,436)	Model 3 (N = 23,436)
	OR (95 % CI) <sup>1</sup>	OR (95 % CI) <sup>1</sup>	OR (95 % CI) <sup>1</sup>	OR (95 % CI) <sup>1</sup>
<b>Psychosocial work exposures</b>				
Low decision latitude	1.85 (1.46–2.36)***	1.30 (0.99–1.70)	1.34 (1.03–1.76)*	1.35 (1.02–1.77)*
High psychological demands	3.61 (2.85–4.59)***	1.63 (1.24–2.14)***	1.62 (1.23–2.12)***	1.60 (1.22–2.10)***
Low social support	3.29 (2.63–4.11)***	1.44 (1.13–1.84)**	1.46 (1.14–1.86)**	1.46 (1.14–1.86)**
Low reward	4.66 (3.49–6.24)***	2.23 (1.56–3.18)***	2.20 (1.53–3.16)***	2.20 (1.54–3.15)***
Bullying	5.06 (4.09–6.26)***	2.37 (1.86–3.02)***	2.37 (1.85–3.02)***	2.39 (1.87–3.04)***
Verbal aggression	2.69 (2.13–3.40)***	1.21 (0.94–1.55)	1.23 (0.96–1.58)	1.22 (0.95–1.55)
Physical/sexual aggression	2.02 (1.10–3.69)*	1.17 (0.59–2.33)	1.36 (0.68–2.75)	1.38 (0.69–2.78)
Work-family conflict	2.09 (1.69–2.58)***	1.52 (1.21–1.90)***	1.51 (1.20–1.91)***	1.53 (1.22–1.93)***
Ethical conflict	3.02 (2.44–3.74)***	1.42 (1.12–1.80)**	1.42 (1.12–1.80)**	1.44 (1.13–1.82)**
Temporary work	0.59 (0.38–0.91)*	0.67 (0.41–1.10)	0.67 (0.41–1.10)	0.67 (0.41–1.09)
Teleworking	1.88 (1.15–3.08)*	1.78 (1.07–2.95)*	1.77 (1.06–2.96)*	1.75 (1.05–2.94)*
Lean management	1.09 (0.87–1.36)	1.01 (0.80–1.29)	1.06 (0.84–1.35)	1.05 (0.83–1.33)
Low meaning	1.62 (1.27–2.07)***	1.46 (1.12–1.90)**	1.46 (1.12–1.90)**	1.45 (1.12–1.90)**
<b>Working time/hours</b>				
Long working hours	1.37 (0.93–2.02)		1.07 (0.70–1.63)	1.09 (0.72–1.67)
Shift work	0.75 (0.54–1.05)		0.63 (0.43–0.90)*	0.64 (0.44–0.94)*
Night work	1.22 (0.79–1.88)		1.08 (0.65–1.77)	1.11 (0.67–1.82)
<b>Other occupational exposures</b>				
Physical exposure (all)	0.98 (0.73–1.32)			1.88 (0.75–4.72)
Physical exposure (noise)	1.01 (0.71–1.44)			0.57 (0.24–1.33)
Physical exposure (temperature)	0.75 (0.48–1.17)			0.44 (0.20–0.97)*
Physical exposure (radiations)	1.81 (0.68–4.82)			1.73 (0.53–5.62)
Physical exposure (controlled air/space)	0.85 (0.31–2.32)			0.54 (0.15–1.94)
Biomechanical exposure (all)	1.04 (0.83–1.32)			0.77 (0.35–1.69)
Biomechanical exposure (manual material handling)	0.96 (0.57–1.62)			0.98 (0.53–1.80)
Biomechanical exposure (posture)	1.09 (0.86–1.38)			1.30 (0.61–2.77)
Biomechanical exposure (repetition)	1.13 (0.60–2.14)			0.88 (0.46–1.69)
Biomechanical exposure (vibration)	0.81 (0.40–1.62)			1.06 (0.47–2.38)
Biomechanical exposure (driving)	0.83 (0.48–1.44)			0.77 (0.38–1.57)
Chemical exposure	0.77 (0.60–0.99)*			0.74 (0.55–0.99)*
Biological exposure	1.00 (0.78–1.29)			1.06 (0.80–1.40)

Models 0: each exposure included in the model separately.

Model 1: all psychosocial work exposures included in the model simultaneously.

Model 2: model 1 + working time/hours.

Model 3: model 2 + other occupational exposures.

\* p < 0.05.

\*\* p < 0.01.

\*\*\* p < 0.001.

<sup>1</sup> All odds-ratios were adjusted for gender, age, marital status, occupation, and economic activity.

**Table 3**

Associations between psychosocial work exposures (main dimensions) and suicidal ideation: final weighted logistic regression model.

	OR (95 % CI) <sup>1</sup> N = 23,759
Low decision latitude	1.30 (0.99–1.70)
High psychological demands	1.65 (1.25–2.16)***
Low social support	1.47 (1.15–1.87)**
Low reward	2.26 (1.59–3.23)***
Bullying	2.46 (1.94–3.13)***
Work-family conflict	1.55 (1.24–1.94)***
Ethical conflict	1.45 (1.15–1.84)**
Teleworking	1.77 (1.07–2.94)*
Low meaning	1.45 (1.11–1.90)**

All exposures included in the model simultaneously.

\* p < 0.05.

\*\* p < 0.01.

\*\*\* p < 0.001.

<sup>1</sup> Odds-ratios adjusted for gender, age, marital status, occupation, and economic activity.

meta-analysis by Milner et al. (Milner et al., 2018) that showed that low decision latitude, high psychological demands, job strain, and low social support were associated with suicidal ideation, with similar magnitude for these associations (pooled ORs of 1.3–1.6). Additionally, we contributed to the literature by providing results for the subdimensions of the job strain model and found that low support from colleagues was a

**Table 4**

Associations between psychosocial work exposures (subdimensions) and suicidal ideation: final weighted logistic regression model.

	OR (95 % CI) <sup>1</sup> N = 23,759
Low skill discretion	1.28 (0.98–1.66)
Low decision authority	0.97 (0.74–1.28)
High psychological demands	1.64 (1.25–2.16)***
Low supervisor support	1.06 (0.81–1.40)
Low colleague support	1.35 (1.04–1.75)*
Low esteem	1.91 (1.39–2.63)***
Low job promotion	1.20 (0.90–1.58)
Low job security	1.84 (1.44–2.35)***
Bullying	2.38 (1.87–3.03)***
Work-family conflict	1.51 (1.20–1.89)***
Ethical conflict	1.37 (1.07–1.74)*
Teleworking	1.74 (1.06–2.85)*
Low meaning	1.38 (1.05–1.80)*

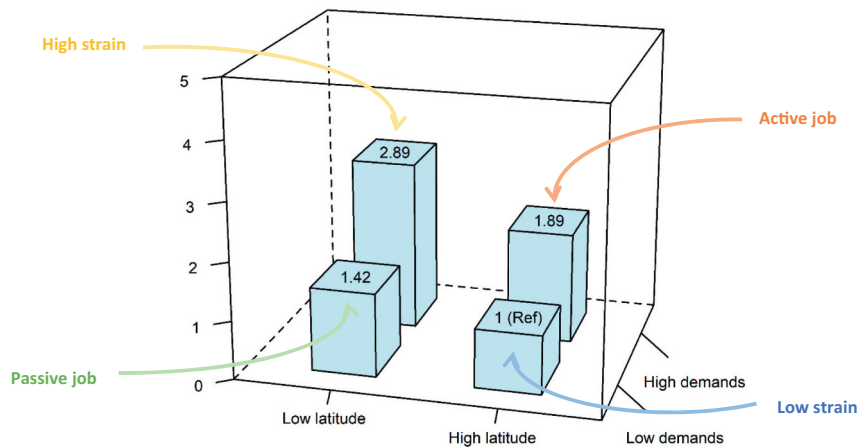
All exposures included in the model simultaneously.

\* p < 0.05.

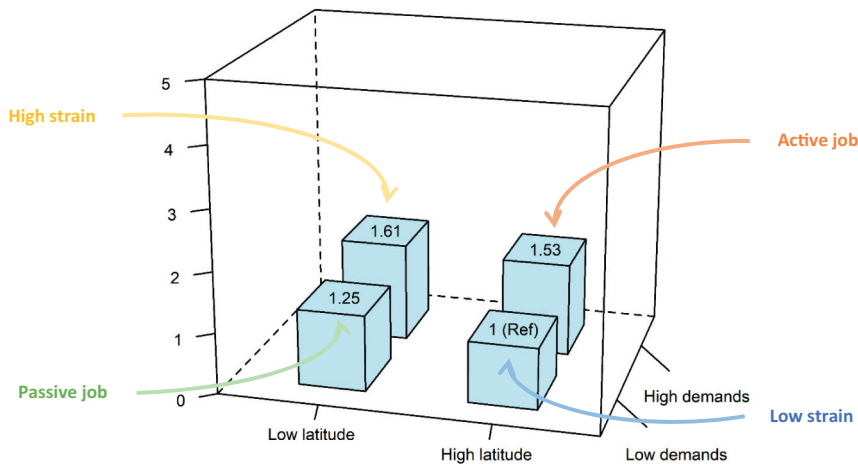
\*\*\* p < 0.001.

<sup>1</sup> Odds-ratios adjusted for gender, age, marital status, occupation, and economic activity.

risk factor for suicide ideation. We also found that job strain, high strain, and active job were associated with suicidal ideation among men. Low reward was found as a risk factor for suicidal ideation in our study, in agreement with two studies (Kim et al., 2020; Zhuo et al., 2020).



**Fig. 1.** Odds-ratios of suicidal ideation associated with the four job situations of the job strain model among men. Odds-ratios adjusted for age, marital status, occupation, economic activity, social support at work, reward, bullying, work-family and ethical conflicts, teleworking, meaning.



**Fig. 2.** Odds-ratios of suicidal ideation associated with the four job situations of the job strain model among women. Odds-ratios adjusted for age, marital status, occupation, economic activity, social support at work, reward, bullying, work-family and ethical conflicts, teleworking, meaning.

Additionally, among the subdimensions of reward, low esteem and low job security were associated with suicidal ideation, in line with the review by Milner et al. (Milner et al., 2018) for job insecurity. Ethical conflict was associated with suicidal ideation in our study, echoing the association between role conflict and suicidal ideation observed in a previous study (Niedhammer et al., 2020). Work-family conflict, teleworking, and low meaning were found as risk factors of suicidal ideation in our study. To our knowledge, our study may be the first one to report such associations in the general working population.

We did not find any association between working hours/time and suicidal ideation, whereas some previous studies reported associations of long working hours and shift work with suicidal ideation (Baek et al., 2023; Han et al., 2021; Kim et al., 2019; Park and Lee, 2022; Yoon et al., 2015). It should be noticed that these previous studies were from South Korea, which may make the comparison difficult due to differences in legislation about working hours/time.

#### 4.3. Strengths and limitations

Our study included the following strengths. The study was based on a large nationally representative sample of the working population of employees. The participation rate to the survey and the response rate to

the self-administered questionnaire were both high. All statistical analyses were done using weighted data making our results generalizable to the whole population. Gender differences and gender-related interactions were tested following good practices (Niedhammer et al., 2000a). Gender differences were found in most studied variables but there was no difference in the prevalence of suicidal ideation between genders. Furthermore, there was almost no difference in the associations between psychosocial work exposures and suicidal ideation between genders. The study of suicidal ideation was based on one item from the PHQ-9 instrument, which is a validated questionnaire to measure depression. We studied a large set of occupational exposures, making our study one of the first studies to cover such a large number of exposures and to provide information about the relative importance of these exposures for suicidal ideation. Psychosocial work exposures were also assessed using validated questionnaires (job strain and effort-reward imbalance models). In addition, other psychosocial work exposures, less frequently studied, were also explored, making our study very comprehensive on the associations of psychosocial work exposures with suicidal ideation. We included pertinent covariates as well as other occupational exposures as adjustment variables to reduce potential residual confounding. Sensitivity analyses were done and confirmed the results.

There were however a number of limitations in our study. The study had a cross-sectional design and no causal interpretation could be done, as reverse causation may be possible. Nevertheless, as only psychosocial work exposures, and no other occupational exposure, were found to be associated with suicidal ideation, this point reinforced the plausibility of the associations. Suicidal ideation was measured using one single item only, which may have led to imprecision. Other authors also used single items to assess suicidal ideation (Baek et al., 2023; Han et al., 2021; Kim et al., 2019; Kim et al., 2020; Park and Lee, 2022; Yoon et al., 2015; Zhuo et al., 2020), but item wording may differ from one study to another, making the comparison between studies difficult. A reporting bias may be possible, as both exposures and outcome were based on self-reported data, leading to common method variance and overestimated associations. Nevertheless, subjective assessment for both psychosocial work exposures and suicidal ideation may be considered fundamental. Furthermore, alternative methods of assessment may be difficult and not without limitations. A large set of psychosocial work exposures were studied but some exposures, such as organisational injustice, were lacking in our study. A healthy worker effect may also be possible, as employees with suicidal ideation might have left the labour market or the most exposed jobs, or even might be on sickness absence at the time of the survey. This selection effect may have led to underestimated associations and may explain some rare results showing protective associations of some exposures with suicidal ideation.

## 5. Conclusion

Our study underlined that psychosocial work exposures were risk factors for suicidal ideation. We also found that other occupational exposures had no role in this outcome. Well-known psychosocial work exposures, such as those related to the job strain model, were associated with suicidal ideation. Other psychosocial work exposures, less frequently studied, such as bullying, job insecurity, role conflicts, and teleworking were also found to be associated with suicidal ideation. Workplace bullying had a particularly high role in suicidal ideation. Our findings suggest that more research is needed in this topic, as suicidal ideation may be considered as a warning signal in the prevention of suicide. Indeed, in line with the suicidal process or continuum that includes “attempted, threatened, and completed” suicide, described by Pompili (Pompili, 2024), suicidal ideation may be seen as a very first step of this continuum. Finally, as psychosocial work exposures are modifiable at the workplace, primary preventive measures to reduce psychosocial work exposures may be useful to prevent suicidal ideation among working populations. In this sense, our study can be seen as a contribution through an epidemiological study, i.e. at a population level, to the “exploration of the source of suffering other than mere diagnosis [that] proves to be a strategic approach to reducing suicide risk” (Pompili, 2024).

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## Ethics approval

Ethical permissions were granted by French ethics committees: Commission Nationale de l'Informatique et des Libertés (no 762430) and Conseil National de l'Information Statistique (no 2016X711TV).

## CRedit authorship contribution statement

**Isabelle Niedhammer:** Conceptualization, Formal analysis, Funding

acquisition, Methodology, Project administration, Writing – original draft, Writing – review & editing. **Elodie Pineau:** Formal analysis, Methodology, Writing – review & editing. **Elodie Rosankis:** Methodology, Writing – review & editing.

## Declaration of competing interest

None.

## Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jad.2024.04.070>.

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