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Sandrine Bertrais, Elodie Pineau, Isabelle Niedhammer. Prospective associations of psychosocial work factors with sickness absence spells and duration: Results from the French national working conditions survey. *American Journal of Industrial Medicine*, 2023, 66 (11), pp.938-951. 10.1002/ajim.23526 . hal-04191258

HAL Id: hal-04191258

<https://hal.science/hal-04191258v1>

Submitted on 23 Sep 2024

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Prospective associations of psychosocial work factors with sickness absence spells and duration: Results from the French national working conditions survey

Sandrine Bertrais PhD  | Elodie Pineau MSc | Isabelle Niedhammer PhD 

INSERM, Univ Angers, Univ Rennes, EHESP, Irset (Institut de recherche en santé, environnement et travail)—UMR_S 1085, ESTER Team, F-49000 Angers, France

Correspondence

Sandrine Bertrais, INSERM UMR 1085—IRSET, Equipe Epidémiologie en Santé au Travail et Ergonomie (ESTER), Faculté de Santé - Département Médecine, 28 rue Roger Amsler, CS 74521, Angers F-49045 Cedex 1, France.

Email: sandrine.bertrais@univ-angers.fr

Funding information

DARES of the French ministry of labour, Grant/Award Number: 2018/037

Abstract

Background: Some psychosocial work factors are associated with sickness absence, however little information is available on the associations of various psychosocial work factors and multiple exposures with sickness absence spells and duration, and gender differences.

Methods: Data were from the French working conditions survey conducted on a nationally representative sample of the working population. The study sample included 17,437 employees (7292 men, 10,145 women) followed from 2013 to 2016 and/or from 2016 to 2019. Occupational exposures (20 psychosocial work factors, 4 working time/hours factors, 4 physical work exposures) were measured at the beginning of each follow-up period. Hurdle and multinomial models were used to study the associations with the number of days and spells of sickness absence.

Results: Most of the psychosocial work factors predicted the risk of at least 1 day of sickness absence. Stronger associations were found among women than men for some factors. Psychosocial work factors were more likely to predict the number of spells than the number of days of sickness absence. Some physical work exposures predicted sickness absence spells and days, whereas shift work in women predicted the risk of at least 1 day of sickness absence. Dose-response associations were found between multiple psychosocial work exposures and sickness absence spells, and between multiple physical exposures and sickness absence spells and days.

Conclusion: Comprehensive prevention policies oriented toward the whole psychosocial and physical work environment should be useful to reduce sickness absence among men and women.

KEYWORDS

multiple exposures, occupational factors, psychosocial work factors, sickness absence, working conditions

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1 | INTRODUCTION

Sickness absence is considered as a good indicator of employee health, for both physical and mental functioning and well-being.^{1,2} In addition, sickness absence has been shown to be a predictive factor for mortality, future morbidity, and disability.³⁻⁵ Furthermore, sickness absence can have negative consequences in costs for workers, employers, and society.⁶

Sickness absence can be influenced by health-related factors and sociodemographic, personal, and work-related factors.^{7,8} The level of evidence was rated as low to moderate for the associations between some psychosocial work factors and sickness absence. The factors related to the job strain model (job demands, job control, and social support) were the most explored in association with sickness absence. A systematic review based on prospective studies showed an increased risk of sickness absence associated with job strain, that is, the combination of high demands and low control.⁹ However, according to two other previous reviews,^{7,8} while a predictive effect of low job control was found, the results for high job demands and low social support remained inconclusive. Another review and meta-analysis found moderate evidence for the association between workplace bullying and subsequent sickness absence.¹⁰ The literature was scantier for effects of other psychosocial work factors, such as emotional demands,¹¹⁻¹³ demands for hiding emotions/emotional dissonance,^{12,14} role conflict,¹¹⁻¹⁵ low supportive leadership,¹³ conflicts with superiors,¹⁶ workplace violence and/or threats of violence,¹⁷⁻¹⁹ work-family conflict,^{12,20} or job insecurity.¹²

A wide range of psychosocial work exposures may be associated with sickness absence, as shown for other health-related outcomes.²¹ Few studies address this issue and the potential cumulative effect of exposures to psychosocial work factors for the risk of sickness absence. Of the studies that focused on job strain, very few tested the synergism between low job control and high job demands, and none found a significant interaction.⁸ In contrast, synergistic effects on the risk of long-term sickness absence were found for high quantitative demands combined with either unclear and contradictory demands, or with violence/threats of violence at work,²² as well as for high emotional demands combined with low possibilities for development or with role conflict.¹¹ Other studies reported that sickness absence increased with the number of psychosocial work exposures.^{23,24}

A number of limitations in the literature on the associations between psychosocial work factors and sickness absence should be pointed out. Various measures of sickness absence were used, making comparisons between studies difficult. Furthermore, most prospective studies focused on one single outcome of sickness absence, especially long-term sickness absence using various definitions and defined using a given threshold of days (binary variable in yes/no). Few prospective studies explored both the presence of sickness absence (as a binary variable) and the duration of sickness absence (i.e., the number of days of sickness absence as a count variable). These studies suggested that psychosocial work factors might be more associated with the presence of any sickness absence than with the duration of sickness absence.^{14,20} However, the

prospective studies examining the associations of psychosocial work factors with the number of spells of sickness absence remained rare.²⁵ The effect modification by gender in the associations between psychosocial work factors and sickness absence was also often disregarded and should be examined, as women have a higher rate of sickness absence than men.²⁶

The following hypotheses were made on the basis of the literature:

1. Sickness absence is an indicator of general health status in our study, and all occupational exposures were assumed to have an impact on sickness absence through a health pathway. Therefore, all studied occupational exposures (except long working hours) are expected to have a negative impact on sickness absence.
2. A dose-response association is expected between the number of exposures and sickness absence.
3. Psychosocial work factors are assumed to be more strongly associated with sickness absence as a binary variable (sickness absence as a yes/no response within the studied period) than with sickness absence duration as a count variable in days. Consequently, psychosocial work factors are expected to be more strongly associated with sickness absence spells than with sickness absence duration.

The objectives of the study were therefore to examine the prospective associations between a broad set of psychosocial work factors and other occupational exposures and sickness absence in a large national sample of French employees. This study aimed to contribute to the literature by providing more information on sickness absence spells and duration, and to explore gender differences as well as the impact of multiple exposures.

2 | MATERIALS AND METHODS

2.1 | Study design and sample

The study was based on prospective data from the last three waves (2013, 2016, 2019) of the survey on working conditions conducted periodically by the French ministry of labour (DARES). This survey included a French nationally representative sample set up in 2013 and followed up in 2016 and 2019. New participants were included in 2016 to correct for attrition and ensure representativeness of the survey sample over time. Thus, as described by the flow chart (Supporting Information: Figure S1), the study included data from two follow-up periods (2013-16, and 2016-2019) with respectively 13,951 and 11,376 employees. For each period, the survey sample was restricted to working employees aged 15-65, who responded to both the face-to-face interview and the self-administered questionnaire of the survey, who had no sickness absence the week preceding the survey at the beginning of each follow-up period, and who had the same job during the follow-up period. Thus, the study sample consisted of 25,327 observations in 17,437 employees.

2.2 | Measurement of sickness absence

The measures of sickness absence used as outcomes were derived from the two following questions at the end of each follow-up period: "How many spells of sickness absence have you had within the last 12 months (excluding maternity leave)? (0, 1, 2, or 3 and more)" and, if any, "How many days of sickness absence have you had within the same period?" The three outcomes were: the presence of at least 1 sickness absence day (binary variable in yes/no), the number of days (count variable) and the number of spells (count variable) of sickness absence within the last 12 months of each follow-up period.

2.3 | Measurement of psychosocial work factors and other occupational exposures

The assessment was based on a large set of questions asked at each survey wave. These data were collected through the face-to-face interview and the self-administered questionnaire. A total of 61 items, close to those of the Copenhagen Psychosocial Questionnaire (COPSOQ) were used to construct 18 psychosocial work factors,²⁷ plus two other factors that were changes at work and temporary employment. These 20 factors were grouped into five domains. Details of the construction can be found elsewhere.^{28–32} Classification in low/high exposure was defined using the initial coding of the factor when based on a single item (emotional demands, role clarity, work–family conflict, job insecurity, temporary employment) and using the median of the total sample at first wave (2013) as cut-off for the factors based on the sum of two or more items. Employees were also asked about their working time/hours (four factors) and physical exposures (four factors). The sum of exposures for each domain was calculated to measure multiple exposure. The assessment of occupational exposures was done at the beginning of each follow-up period.

2.4 | Covariates

Gender, age, marital/cohabiting status, occupation, and economic activity of the company both coded using standard French classifications, at the beginning of each follow-up period, were included as main covariates.

2.5 | Statistical methods

All statistical analyses were performed using weighted data, to take into account attrition, nonresponse and calibration to extrapolate the results to the population of employees in France.

Descriptive analyses were done using R software, and regression modeling was carried out with STATA version 15. First, the prospective associations of psychosocial work factors and other occupational exposures with sickness absence days were assessed using Hurdle models. This regression approach is well appropriate for count data,

such as sickness absence, with excess of zeros (i.e., high number of employees without any sickness absence) and a skewed and spread distribution of positive count data (i.e., high variability in the number of days in employees with sickness absence) violating the assumption of equality of mean and variance required to use ordinary count data models. In addition, Hurdle models allowed to study both the presence of at least 1 sickness absence day within the last 12 months preceding the follow-up survey (using logistic regression model), and the duration of sickness absence in days among the employees with at least 1 day of sickness absence (using a truncated negative binomial regression model). As the number of sickness absence spells was collected in 4 categories (0, 1, 2, 3, or more), the prospective associations of psychosocial work factors and other occupational exposures with the number of sickness absence spells were studied using multinomial logistic regression models with 0 as the reference category. For all analyses, we used mixed-effects models by adding a random intercept on individuals to account that employees might have two follow-up periods (observations), that is, to control for nonindependence of data within individuals. Results are presented separately in men and women. Gender differences in the associations between occupational exposures and sickness absence were assessed through multiplicative and additive interaction analyses using the sample of men and women together. Interactions on the multiplicative risk ratio scale were evaluated by testing the significance at $p < 0.05$ of the product term between gender and occupational exposure. The deviation from additivity in risks associated with gender and occupational exposure was quantified through calculation of relative excess risk due to interaction (RERI) and its confidence interval (CI).³³

All reported results were adjusted for the covariates and time period (2016–2019 vs. 2013–2016). Unadjusted results were found to be similar (not shown). A summary of the study design can be found in Supporting Information: Figure S2.

2.6 | Sensitivity analyses

To check the robustness of the results, we examined the associations after additional adjustment for full/part-time work, chronic disease, and personal life events during the follow-up period (serious personal health problems, serious health problems or death of a close family member, family conflict, and exposure to violence). Additional sensitivity analyses examined the associations of psychosocial work factors with sickness absence after adjustment for other occupational exposures.

3 | RESULTS

3.1 | Characteristics of the study sample

The characteristics of the 17,437 employees at entry into the study sample (i.e., at the beginning of their first follow-up period) are presented in Supporting Information: Tables S1 and S2. There were significant differences between genders for marital/cohabiting status,

occupation and economic activity. The prevalence of most occupational exposures differed between men and women.

The rate of employees with at least 1 sickness absence day within the last 12 months was similar for both follow-up periods, and this rate was higher among women (37%) than among men (31%) (Table 1). Women had a higher number of spells of sickness absence than men. The total number of days of sickness absence was higher in women than in men for the first follow-up period (2013–2016).

3.2 | Prospective associations of each psychosocial work factor with sickness absence

Almost all the 20 studied psychosocial work factors, except 3 factors, were predictive of at least 1 day of sickness absence after adjustment for covariates among men, women, or both (Tables 2 and 3). High emotional demands, low influence, low possibilities for development, low role clarity, high role conflict, low job satisfaction, high changes at work and high internal violence predicted the risk of at least 1 day of sickness absence in both genders, with stronger associations among women than among men for low influence, high role conflict and high internal violence. High quantitative demands, high cognitive demands, low predictability and low social support predicted the risk of at least 1 day of sickness absence among women only. Most of the gender-related interactions were found to be additive and not multiplicative (Supporting Information: Table S3). The number of psychosocial work factors prospectively associated with the number of days of sickness absence (among the employees with at least 1 day

of sickness absence) was low: high role conflict, low social support and low job satisfaction in both genders, as well as low predictability among men. Almost all psychosocial work factors predicted the number of spells of sickness absence for men, women or both, and the magnitude of the associations tended to be higher with increasing number of spells.

3.3 | Prospective associations between other occupational exposures and sickness absence

Among the factors related to working time/hours, shift work was predictive of at least 1 day of sickness absence among women, while a negative association was observed for long working hours among men (Tables 2 and 3). Physical work exposures (except exposure to toxic/dangerous products) predicted at least 1 day of sickness absence in both genders, and the association for noise exposure was stronger among women than among men (Supporting Information: Table S3). Bio-mechanical exposure in both genders, as well as exposure to fumes/dust among women, predicted the number of days and spells of sickness absence. Noise predicted the number of sickness absence spells.

3.4 | Multiple exposures and sickness absence

In both genders, the risk of at least 1 day of sickness absence increased with the number of exposures for all domains of psychosocial work factors, and for physical exposures (Tables 4 and 5).

TABLE 1 Description of the 12-month sickness absence outcomes at the end of each follow-up period.

	Follow-up period #1 (2013–2016) N = 13,951			Follow-up period #2 (2016–2019) N = 11,376		
	Men (N = 5827) n (w%)	Women (N = 8124) n (w%)	p Value for gender difference	Men (N = 4706) n (w%)	Women (N = 6670) n (w%)	p Value for gender difference
At least one sickness absence day			<0.001			<0.001
No	3991 (68.6%)	5122 (63.4%)		3283 (68.8%)	4194 (62.5%)	
Yes	1836 (31.4%)	3002 (36.6%)		1423 (31.2%)	2476 (37.5%)	
Number of spells of sickness absence			<0.001			0.002
0	3991 (68.6%)	5122 (63.4%)		3283 (68.8%)	4194 (62.5%)	
1	1341 (23.1%)	2121 (25.4%)		1075 (23.5%)	1770 (27.2%)	
2	301 (5.0%)	557 (7.4%)		247 (5.8%)	471 (7.3%)	
3 or more	194 (3.3%)	324 (3.9%)		101 (2.0%)	235 (3.0%)	
Total number of days of sickness absence (among the subsample of those with sickness absence)			0.017			0.236
Median (IQR)	7 (3–21)	10 (4–30)		10 (3–30)	10 (4–30)	
Mean (SD)	25 (43)	28 (52)		29 (53)	34 (62)	
Range	1–365	1–365		1–365	1–365	

Note: n (w%): Unweighted frequency (weighted percentage). Differences between genders were tested using the Rao-Scott χ^2 test.

TABLE 2 Prospective associations between occupational factors and sickness absence in men: Results from Hurdle and multinomial mixed effects models on weighted data (each factor studied separately).

	Hurdle mixed effects models		Multinomial mixed effects models (0 as reference category)		
	Binary logistic model At least one sickness absence day OR (95% CI)	Negative binomial model Total number of days of sickness absence RR (95% CI)	Number of sickness absence spells		
			1 RR (95% CI)	2 RR (95% CI)	≥3 RR (95% CI)
Psychosocial work factors					
<i>Demands at work</i>					
High quantitative demands	1.17 (0.96–1.42)	1.10 (0.93–1.30)	1.12 (0.93–1.37)	1.32 (0.83–2.09)	1.39 (0.89–2.18)
High cognitive demands	1.03 (0.84–1.25)	0.95 (0.80–1.13)	1.00 (0.82–1.22)	1.28 (0.80–2.03)	1.08 (0.69–1.68)
High emotional demands	1.38 (1.12–1.69)	1.04 (0.87–1.24)	1.28 (1.05–1.57)	1.96 (1.24–3.09)	1.67 (1.05–2.67)
High demands for hiding emotions	1.21 (0.99–1.47)	1.00 (0.85–1.19)	1.11 (0.91–1.35)	1.59 (1.04–2.45)	2.12 (1.37–3.29)
<i>Work organization and job content</i>					
Low influence	1.23 (1.01–1.49)	0.92 (0.78–1.07)	1.19 (0.98–1.45)	1.31 (0.85–2.01)	1.37 (0.88–2.12)
Low degree of freedom	1.11 (0.91–1.35)	1.07 (0.90–1.28)	1.09 (0.89–1.32)	1.21 (0.79–1.86)	1.09 (0.69–1.72)
Low possibilities for development	1.47 (1.21–1.79)	1.09 (0.92–1.28)	1.36 (1.12–1.65)	1.76 (1.12–2.75)	2.60 (1.56–4.36)
Low meaning of work	1.37 (1.13–1.66)	0.99 (0.84–1.18)	1.26 (1.04–1.52)	2.21 (1.44–3.37)	1.80 (1.14–2.83)
<i>Interpersonal relations</i>					
Low predictability	0.88 (0.72–1.08)	1.30 (1.09–1.54)	0.84 (0.69–1.03)	1.12 (0.72–1.75)	1.15 (0.74–1.79)
Low role clarity	1.46 (1.16–1.84)	0.99 (0.82–1.20)	1.41 (1.12–1.77)	1.78 (1.08–2.93)	1.52 (0.91–2.55)
High role conflict	1.50 (1.24–1.81)	1.23 (1.05–1.45)	1.43 (1.19–1.72)	1.79 (1.17–2.76)	1.86 (1.17–2.97)
Low social support	1.20 (0.99–1.45)	1.22 (1.02–1.45)	1.17 (0.97–1.41)	1.25 (0.82–1.90)	1.66 (1.07–2.59)
Low sense of community	1.39 (1.15–1.67)	1.03 (0.87–1.21)	1.28 (1.06–1.54)	1.84 (1.21–2.80)	2.64 (1.70–4.11)
<i>Work-individual interface</i>					
Low job satisfaction	1.47 (1.21–1.79)	1.26 (1.07–1.48)	1.38 (1.14–1.68)	1.94 (1.27–2.96)	1.63 (1.03–2.60)
Work-family conflict	1.19 (0.98–1.45)	0.85 (0.71–1.02)	1.19 (0.98–1.44)	1.21 (0.77–1.90)	1.18 (0.75–1.86)
Job insecurity	1.12 (0.88–1.42)	1.21 (0.99–1.49)	1.02 (0.80–1.29)	1.72 (1.03–2.86)	1.43 (0.84–2.44)
High changes at work	1.22 (1.00–1.48)	1.16 (0.98–1.36)	1.19 (0.98–1.44)	1.30 (0.84–2.03)	1.26 (0.81–1.97)
Temporary employment	0.69 (0.44–1.08)	1.14 (0.82–1.59)	0.70 (0.45–1.09)	0.32 (0.10–1.09)	1.06 (0.44–2.53)
<i>Workplace violence</i>					
High internal violence	1.33 (1.10–1.61)	1.07 (0.89–1.27)	1.34 (1.10–1.61)	1.33 (0.88–2.01)	1.26 (0.81–1.96)
High external violence	1.14 (0.93–1.40)	1.03 (0.85–1.26)	1.09 (0.89–1.33)	1.41 (0.89–2.24)	1.30 (0.82–2.06)
Factors related to working time/hours					
Long working hours (>48 h/week)	0.68 (0.48–0.97)	1.05 (0.76–1.45)	0.79 (0.56–1.12)	0.38 (0.16–0.91)	0.10 (0.03–0.33)
Shift work	1.26 (0.90–1.75)	0.96 (0.76–1.22)	1.16 (0.85–1.58)	1.73 (0.83–3.62)	1.45 (0.74–2.87)
Unsocial work days	0.99 (0.75–1.30)	0.98 (0.76–1.26)	0.98 (0.74–1.29)	1.07 (0.60–1.92)	0.97 (0.54–1.74)
Night work	0.96 (0.68–1.36)	0.92 (0.70–1.21)	1.00 (0.71–1.41)	0.69 (0.32–1.47)	0.74 (0.37–1.48)

TABLE 2 (Continued)

	Hurdle mixed effects models		Multinomial mixed effects models (0 as reference category)		
	Binary logistic model	Negative binomial model	Number of sickness absence spells		
	At least one sickness absence day OR (95% CI)	Total number of days of sickness absence RR (95% CI)	1 RR (95% CI)	2 RR (95% CI)	≥3 RR (95% CI)
Physical work exposures					
Biomechanical exposure	1.32 (1.05–1.66)	1.42 (1.17–1.72)	1.22 (0.98–1.53)	1.77 (1.05–2.99)	2.08 (1.20–3.60)
Fumes/dust	1.30 (1.05–1.62)	1.06 (0.89–1.28)	1.22 (0.98–1.51)	1.71 (1.08–2.69)	1.35 (0.84–2.18)
Toxic/dangerous products	1.18 (0.96–1.45)	1.18 (1.00–1.40)	1.11 (0.91–1.36)	1.60 (1.03–2.48)	1.25 (0.78–1.99)
Noise	1.33 (1.05–1.68)	1.01 (0.84–1.21)	1.18 (0.93–1.48)	1.97 (1.20–3.23)	3.01 (1.71–5.31)

Note: Workers were classified into no/low or high exposure groups using the initial coding for the factors based on one item (emotional demands, role clarity, job insecurity, temporary employment, work–family conflict) and using the median of the total sample at first wave (2013) as cut-off for the factors based on more than one item. Adjustment for age, marital status, occupation, economic activity, and follow-up time period. OR and RR in bold were significant at $p < 0.05$.

Abbreviations: CI, confidence interval; OR, odds ratio; RR, rate ratio.

Dose–response associations were found between the number of psychosocial and physical exposures and the risk of sickness absence spells. Dose–response associations were observed between multiple exposure to interpersonal relations and work–individual interface among men, and to physical exposures for both genders, and the number of days of sickness absence among the employees with at least 1 day of absence.

3.5 | Sensitivity analyses

Results were unchanged after additional adjustment for full/part-time work. Very similar results were obtained after additional adjustment for chronic disease or personal life events, although estimates were reduced slightly. Finally, further adjustment for other occupational exposures when studying psychosocial work factors did not modify the results.

4 | DISCUSSION

4.1 | Main results

Almost all of the 20 psychosocial work factors were prospectively associated with the risk of at least 1 day of sickness absence. Psychosocial work factors were more likely to predict the number of spells than the number of days of sickness absence. Shift work among women predicted at least 1 day of sickness absence. Some physical work exposures predicted both the number of sickness absence spells and days. Stronger associations were found for seven psychosocial work factors and noise exposure in women. In both genders, the risk of at least 1 day of sickness absence and the number of spells of sickness absence increased with multiple psychosocial

and physical exposures. The duration of sickness absence increased with multiple physical exposures.

4.2 | Comparison with previous studies

4.2.1 | Psychosocial work factors

The comparison with the literature may be difficult, because most previous prospective studies focused on long-term sickness absence. Our findings were in line with previously results on the associations between psychosocial work exposures, including high job demands,^{11–13} low influence at work,^{11,12,15} low possibilities for development,^{11,13} low meaning at work,¹² low predictability,¹² high role conflict,^{11–13,15} low social support,^{18,34} low sense of community,¹² low job satisfaction,¹² workplace violence,^{17–19} work–family conflict,^{12,20} high changes at work,¹² and job insecurity^{12,20} and sickness absence. Thus our results confirmed that various psychosocial work factors may be involved and the risk of sickness absence may increase with multiple psychosocial work exposures.^{11,22–24} Our study added new information on the associations with the number of spells and days of sickness absence. In agreement with the rare previous prospective studies that assessed the associations with the duration of sickness absence among those with at least 1 day of sickness absence,^{14,20} a low number of psychosocial work factors predicted the duration of sickness absence. To our knowledge, this is the first prospective study showing strong associations between psychosocial work factors and the number of sickness absence spells. Furthermore, very few prospective studies explored the associations between psychosocial work factors and sickness absence separately in men and women^{15,20,34,35} and still fewer studies tested gender differences in these associations using formal interaction testing. Our results highlighted that there were more and stronger associations of

TABLE 3 Prospective associations between occupational factors and sickness absence in women: Results from Hurdle and multinomial mixed effects models on weighted data (each factor studied separately).

	Hurdle mixed effects models		Multinomial mixed effects models (0 as reference category)		
	Binary logistic model	Negative binomial model	Number of sickness absence spells		
	At least 1 sickness absence day OR (95% CI)	Total number of days of sickness absence RR (95% CI)	1 RR (95% CI)	2 RR (95% CI)	≥3 RR (95% CI)
Psychosocial work factors					
<i>Demands at work</i>					
High quantitative demands	1.39 (1.15–1.68)	1.09 (0.93–1.28)	1.33 (1.10–1.61)	1.53 (1.10–2.14)	1.78 (1.18–2.68)
High cognitive demands	1.26 (1.05–1.52)	1.14 (0.97–1.33)	1.22 (1.01–1.47)	1.47 (1.03–2.09)	1.58 (1.05–2.38)
High emotional demands	1.46 (1.21–1.78)	0.89 (0.75–1.06)	1.42 (1.17–1.72)	1.50 (1.03–2.19)	2.08 (1.34–3.23)
High demands for hiding emotions	1.19 (0.99–1.43)	1.07 (0.91–1.25)	1.18 (0.98–1.43)	1.00 (0.70–1.43)	2.20 (1.42–3.40)
<i>Work organization and job content</i>					
Low influence	1.71 (1.43–2.05)	1.11 (0.95–1.29)	1.66 (1.39–1.98)	1.71 (1.19–2.45)	2.81 (1.85–4.29)
Low degree of freedom	1.15 (0.96–1.38)	1.10 (0.94–1.28)	1.08 (0.90–1.30)	1.34 (0.95–1.89)	1.54 (0.99–2.38)
Low possibilities for development	1.20 (1.01–1.44)	1.11 (0.95–1.29)	1.14 (0.95–1.36)	1.35 (0.97–1.89)	1.83 (1.20–2.78)
Low meaning of work	1.13 (0.95–1.35)	0.96 (0.82–1.11)	1.06 (0.89–1.26)	1.32 (0.95–1.84)	1.87 (1.21–2.88)
<i>Interpersonal relations</i>					
Low predictability	1.21 (1.01–1.44)	1.06 (0.91–1.23)	1.23 (1.03–1.47)	1.20 (0.86–1.66)	1.05 (0.68–1.60)
Low role clarity	1.51 (1.22–1.87)	0.89 (0.75–1.06)	1.55 (1.25–1.93)	1.19 (0.84–1.70)	1.78 (1.10–2.88)
High role conflict	1.70 (1.42–2.03)	1.18 (1.02–1.37)	1.60 (1.33–1.91)	1.93 (1.37–2.70)	3.08 (2.00–4.74)
Low social support	1.45 (1.22–1.73)	1.19 (1.02–1.39)	1.39 (1.17–1.67)	1.54 (1.11–2.13)	2.19 (1.48–3.23)
Low sense of community	1.18 (0.99–1.41)	1.08 (0.93–1.26)	1.13 (0.95–1.35)	1.32 (0.94–1.87)	1.27 (0.84–1.93)
<i>Work-individual interface</i>					
Low job satisfaction	1.59 (1.33–1.90)	1.25 (1.07–1.45)	1.48 (1.24–1.77)	1.85 (1.31–2.60)	2.53 (1.67–3.84)
Work-family conflict	1.30 (1.08–1.56)	1.06 (0.91–1.23)	1.25 (1.05–1.50)	1.39 (0.99–1.95)	2.05 (1.33–3.16)
Job insecurity	1.36 (1.09–1.69)	1.15 (0.95–1.38)	1.35 (1.08–1.69)	1.24 (0.85–1.82)	1.65 (1.00–2.73)
High changes at work	1.34 (1.12–1.61)	1.12 (0.97–1.30)	1.28 (1.07–1.54)	1.48 (1.04–2.11)	1.86 (1.22–2.84)
Temporary employment	0.76 (0.50–1.15)	0.63 (0.48–0.81)	0.79 (0.53–1.20)	0.71 (0.31–1.62)	0.19 (0.09–0.41)
<i>Workplace violence</i>					
High internal violence	1.68 (1.40–2.01)	1.09 (0.93–1.28)	1.52 (1.26–1.82)	2.03 (1.45–2.86)	4.14 (2.63–6.50)
High external violence	1.21 (1.00–1.46)	1.08 (0.92–1.26)	1.15 (0.96–1.39)	1.32 (0.91–1.94)	1.98 (1.27–3.08)
Factors related to working time/hours					
Long working hours (>48 h/week)	0.67 (0.43–1.05)	1.01 (0.68–1.48)	0.70 (0.44–1.10)	0.57 (0.25–1.33)	0.70 (0.19–2.65)
Shift work	1.61 (1.17–2.21)	0.99 (0.80–1.24)	1.64 (1.19–2.25)	1.44 (0.87–2.38)	1.39 (0.69–2.77)
Unsocial work days	0.96 (0.75–1.23)	1.10 (0.90–1.34)	1.00 (0.79–1.27)	0.78 (0.50–1.21)	0.78 (0.43–1.42)
Night work	1.36 (0.91–2.03)	1.01 (0.71–1.43)	1.31 (0.89–1.94)	1.33 (0.69–2.56)	1.97 (0.65–5.94)

TABLE 3 (Continued)

	Hurdle mixed effects models		Multinomial mixed effects models (0 as reference category)		
	Binary logistic model	Negative binomial model	Number of sickness absence spells		
	At least 1 sickness absence day OR (95% CI)	Total number of days of sickness absence RR (95% CI)	1 RR (95% CI)	2 RR (95% CI)	≥3 RR (95% CI)
Physical work exposures					
Biomechanical exposure	1.38 (1.14–1.68)	1.36 (1.16–1.59)	1.31 (1.08–1.58)	1.53 (1.06–2.22)	2.34 (1.42–3.86)
Fumes/dust	1.46 (1.16–1.83)	1.30 (1.07–1.58)	1.41 (1.11–1.77)	1.46 (1.01–2.10)	2.74 (1.62–4.64)
Toxic/dangerous products	1.18 (0.96–1.46)	1.13 (0.96–1.32)	1.14 (0.93–1.40)	1.25 (0.87–1.80)	1.36 (0.80–2.30)
Noise	2.16 (1.64–2.83)	0.95 (0.77–1.16)	2.05 (1.56–2.68)	2.60 (1.54–4.38)	2.48 (1.45–4.25)

Note: Workers were classified into no/low or high exposure groups using the initial coding for the factors based on one item (emotional demands, role clarity, job insecurity, temporary employment, work–family conflict) and using the median of the total sample at first wave (2013) as cut-off for the factors based on more than one item. Adjustment for age, marital status, occupation, economic activity and follow-up time period. OR and RR in bold were significant at $p < 0.05$.

Abbreviations: CI, confidence interval; OR, odds ratio; RR, rate ratio.

psychosocial work factors with at least 1 day of sickness absence in women than in men.

4.2.2 | Factors related to working time/hours

Our results showed that long working hours reduced the risk of at least 1 day of sickness absence in men, which was consistent with a healthy worker effect and the conclusions of a recent systematic literature review based on 16 observational studies.³⁶ All the five prospective studies included in this systematic review reported a significant negative association. Shift work predicted the risk of at least 1 day of sickness absence among women in our study. Most findings for the association between shift work and sickness absence were inconclusive in the literature.³⁷

4.2.3 | Physical exposures

The observed association between high biomechanical exposure and sickness absence was consistent with some rare previous prospective studies reporting significant associations for various measures of physical workload^{38–41} or some specific biomechanical constraints.^{11,15,38} Our results also confirmed the significant association of physical workload with the duration of sickness absence observed in one of these studies.⁴⁰

Very few prospective studies explored the associations of other physical exposures with sickness absence. A measure of hazardous exposure at work including chemicals, dust and noise was found to be associated with sickness absence previously,⁴¹ and another study showed a dose–response association between the level of hazardous exposures (including dirt, dust, dampness, noise, solvents, other irritating substances, and problems with lighting, or temperature) and the number of sickness absence days.⁴⁰ Our study extended these previous results, and showed

the associations of some specific hazardous exposures (fumes/dust, noise) with sickness absence in both genders, and a stronger association between noise and sickness absence in women. Our results underlined the effects of these exposures on the number of sickness absence spells and days, as well as dose–response associations with the number of physical work exposures.

4.3 | Strengths and limitations

The strengths of the study included the representativeness and large size of the sample. The findings can be extrapolated to the French working population of employees thanks to the sampling design of the survey and the use of weights that took nonresponse and calibration into account. The large sample size allowed us to investigate the associations among men and women separately and to test effect modification by gender, which was done in very few prospective studies.^{20,42} Our study had a prospective design with clear chronological order between exposure and outcome. This study investigated a large set of psychosocial work factors and multiple exposures in association with sickness absence, whereas most previous studies focused on a limited number of psychosocial work factors. Furthermore, the associations of working hours/time and physical exposures with sickness absence were also studied. We additionally adjusted for working hours/time and physical exposures in the study of psychosocial work factors and found similar results in a sensitivity analysis, suggesting no confounding role and no effect modification. The use of Hurdle models in this study was also a strength, which was statistically relevant given the zero-inflated and over-dispersed distribution of the number of days of sickness absence. This method also had the advantage to study the effects of occupational factors on the duration of sickness absence among those with at least 1 day of sickness absence. We were also able to study the effects of occupational factors on both the number of

TABLE 4 Prospective associations between multiple occupational exposures and sickness absence in men: Results from Hurdle and multinomial mixed effects models on weighted data (each factor domain studied separately).

Factor domain Number of exposures ^a	Hurdle mixed effects models		Multinomial mixed effects models (0 as reference category)		
	Binary logistic model	Negative binomial model	Number of sickness absence spells		
	At least 1 sickness absence day OR (95% CI)	Total number of days of sickness absence RR (95% CI)	1 RR (95% CI)	2 RR (95% CI)	≥3 RR (95% CI)
Psychosocial work factors					
<i>Demands at work</i>					
0	Ref.	Ref.	Ref.	Ref.	Ref.
1	1.16 (0.86–1.58)	0.91 (0.71–1.18)	1.08 (0.80–1.46)	1.47 (0.74–2.91)	2.32 (1.09–4.95)
2	1.32 (0.97–1.79)	0.83 (0.64–1.08)	1.27 (0.93–1.73)	1.33 (0.69–2.57)	1.88 (0.91–3.87)
3	1.36 (0.98–1.89)	0.98 (0.73–1.31)	1.27 (0.92–1.75)	1.88 (0.93–3.81)	2.36 (1.08–5.15)
4	1.68 (1.15–2.45)	1.07 (0.78–1.47)	1.35 (0.94–1.95)	3.80 (1.54–9.38)	4.88 (1.99–12.0)
<i>P for trend</i>	0.005	0.558			
<i>Work organization and job content</i>					
0	Ref.	Ref.	Ref.	Ref.	Ref.
1	1.35 (0.98–1.87)	1.05 (0.81–1.37)	1.25 (0.90–1.73)	1.82 (0.85–3.88)	2.70 (1.02–7.11)
2	1.63 (1.19–2.24)	1.10 (0.84–1.45)	1.55 (1.13–2.13)	1.66 (0.78–3.54)	3.20 (1.15–8.88)
3	1.86 (1.33–2.59)	1.18 (0.88–1.58)	1.64 (1.18–2.30)	2.83 (1.34–6.01)	4.59 (1.68–12.5)
4	2.14 (1.47–3.12)	0.98 (0.71–1.36)	1.82 (1.25–2.66)	3.73 (1.63–8.56)	5.24 (1.87–14.7)
<i>P for trend</i>	<0.001	0.822			
<i>Interpersonal relations</i>					
0	Ref.	Ref.			
1	1.17 (0.76–1.79)	0.92 (0.65–1.30)			
2	1.24 (0.81–1.87)	1.09 (0.77–1.53)		Not available ^b	
3	1.37 (0.89–2.09)	1.18 (0.81–1.71)			
4 or 5	1.91 (1.25–2.92)	1.29 (0.91–1.83)			
<i>P for trend</i>	0.002	0.049			
<i>Work-individual interface</i>					
0	Ref.	Ref.	Ref.	Ref.	Ref.
1	1.21 (0.90–1.65)	1.02 (0.76–1.38)	1.28 (0.95–1.73)	0.95 (0.47–1.91)	1.16 (0.52–2.58)
2	1.31 (0.96–1.77)	1.17 (0.88–1.57)	1.29 (0.95–1.75)	1.42 (0.73–2.77)	1.51 (0.68–3.34)
3	1.58 (1.14–2.18)	1.10 (0.82–1.47)	1.55 (1.12–2.14)	1.95 (0.99–3.86)	1.50 (0.70–3.19)
4 or 5	1.80 (1.22–2.65)	1.52 (1.03–2.26)	1.63 (1.11–2.40)	2.19 (0.97–4.97)	2.81 (1.04–7.54)
<i>P for trend</i>	<0.001	0.028			
<i>Workplace violence</i>					
0	Ref.	Ref.	Ref.	Ref.	Ref.
1	1.39 (1.11–1.73)	0.95 (0.78–1.15)	1.43 (1.15–1.78)	1.25 (0.76–2.06)	1.18 (0.70–1.97)
2	1.36 (1.06–1.75)	1.12 (0.88–1.41)	1.31 (1.02–1.67)	1.68 (0.97–2.91)	1.50 (0.82–2.74)
<i>P for trend</i>	0.015	0.366			

TABLE 4 (Continued)

Factor domain Number of exposures ^a	Hurdle mixed effects models		Multinomial mixed effects models (0 as reference category)		
	Binary logistic model	Negative binomial model	Number of sickness absence spells		
	At least 1 sickness absence day OR (95% CI)	Total number of days of sickness absence RR (95% CI)	1 RR (95% CI)	2 RR (95% CI)	≥3 RR (95% CI)
<i>All psychosocial work factors^c</i>					
Q1	Ref.	Ref.	Ref.	Ref.	Ref.
Q2	1.26 (0.97–1.63)	1.00 (0.80–1.24)	1.24 (0.96–1.62)	0.98 (0.53–1.78)	2.01 (1.09–3.70)
Q3	1.38 (1.06–1.81)	1.25 (0.98–1.60)	1.40 (1.08–1.83)	1.24 (0.66–2.34)	1.61 (0.94–2.77)
Q4	1.87 (1.41–2.48)	1.09 (0.88–1.36)	1.68 (1.27–2.22)	2.61 (1.40–4.86)	3.32 (1.77–6.23)
<i>P for trend</i>	<0.001	0.180			
Factors related to working time/hours					
0	Ref.	Ref.	Ref.	Ref.	Ref.
1	0.93 (0.74–1.18)	0.90 (0.74–1.10)	0.93 (0.74–1.17)	1.12 (0.67–1.86)	0.69 (0.40–1.17)
2	1.25 (0.83–1.87)	1.01 (0.72–1.41)	1.35 (0.91–2.01)	0.65 (0.29–1.45)	0.85 (0.40–1.80)
3 or 4	0.56 (0.28–1.09)	0.99 (0.61–1.61)	0.50 (0.25–0.98)	0.74 (0.16–3.54)	0.56 (0.13–2.42)
<i>P for trend</i>	0.167	0.923			
Physical work exposures					
0	Ref.	Ref.	Ref.	Ref.	Ref.
1	1.10 (0.82–1.47)	1.39 (1.06–1.83)	1.12 (0.84–1.49)	0.82 (0.41–1.65)	1.46 (0.69–3.06)
2	1.07 (0.79–1.46)	1.51 (1.17–1.97)	1.02 (0.76–1.38)	1.15 (0.58–2.29)	1.71 (0.84–3.48)
3	1.38 (1.01–1.89)	1.43 (1.10–1.86)	1.23 (0.90–1.68)	2.13 (1.05–4.31)	2.59 (1.24–5.42)
4	1.97 (1.35–2.89)	1.49 (1.11–1.99)	1.69 (1.16–2.45)	3.50 (1.52–8.05)	4.26 (1.84–9.85)
<i>P for trend</i>	<0.001	0.016			

Note: Adjustment for age, marital status, occupation, economic activity and follow-up time period. OR and RR in bold were significant at $p < 0.05$.

Abbreviations: CI, confidence interval; OR, odds ratio; RR, rate ratio.

^aMultiple exposure was assessed by counting the number of occupational exposures for each factor domain, unless otherwise specified.

^bMultinomial mixed effects model did not converge.

^cQuartiles of the total number of psychosocial work exposures.

spells and the duration of sickness absence. We excluded employees with recent sickness absence and adjusted for relevant covariates.

This study had some limitations that should be mentioned. Psychosocial work factors were proxies of the COPSOQ scales, but were not assessed using the validated questionnaire, which may have resulted in inaccurate measurements and misclassifications. Some rare psychosocial work factors found to be associated with sickness absence in some previous studies were lacking in our study, in particular quality of leadership.^{13,42} Sickness absence data were self-reported. However, previous studies showed that there were high correlations between self-reports and register data for sickness absence.⁴³ We had information about the number of spells and the total number of days of sickness absence, but no complete data on the number of days of each spell. We did not study sickness presenteeism as no data on sickness presenteeism were available for the study period between 2013 and 2019. A reporting bias related to common method variance may be suspected as both exposure and outcome were self-reported and may have led to potential

overestimated associations, but this bias may be assumed to be small because exposure and outcome were measured 3 years apart. Multiple testing might have led to some rare wrongly significant associations. The study sample was restricted to the employees who did not change job during the follow-up period, this could have induced a potential selection bias due to the exclusion of employees who left their job because of poor health related to poor working conditions. In addition, we cannot exclude that exposure had changed during the 3-year follow-up period. These two last points may have led to misclassification and underestimated associations.

5 | CONCLUSIONS

This study on a large national sample of French employees provided information on the associations between a wide range of occupational exposures and the number of spells and days of sickness

TABLE 5 Prospective associations between multiple occupational exposures and sickness absence in women: Results from Hurdle and multinomial mixed effects models on weighted data (each factor domain studied separately).

Factor domain Number of exposures ^a	Hurdle mixed effects models		Multinomial mixed effects models (0 as reference category)		
	Binary logistic model At least 1 sickness absence day OR (95% CI)	Negative binomial model Total number of days of sickness absence RR (95% CI)	Number of sickness absence spells		
			1 RR (95% CI)	2 RR (95% CI)	≥3 RR (95% CI)
Psychosocial work factors					
<i>Demands at work</i>					
0	Ref.	Ref.	Ref.	Ref.	Ref.
1	1.40 (0.99–2.00)	1.00 (0.72–1.38)	1.51 (1.06–2.15)	0.90 (0.43–1.89)	1.37 (0.63–3.02)
2	1.64 (1.16–2.33)	0.96 (0.71–1.30)	1.72 (1.21–2.45)	1.18 (0.60–2.32)	1.92 (0.86–4.25)
3	1.60 (1.13–2.26)	1.09 (0.79–1.50)	1.58 (1.11–2.26)	1.36 (0.72–2.56)	3.26 (1.49–7.11)
4	2.23 (1.55–3.22)	1.06 (0.78–1.45)	2.19 (1.50–3.19)	1.94 (1.01–3.71)	4.29 (1.93–9.54)
<i>P for trend</i>	<0.001	0.551			
<i>Work organization and job content</i>					
0	Ref.	Ref.	Ref.	Ref.	Ref.
1	1.14 (0.76–1.70)	1.17 (0.80–1.70)	1.10 (0.73–1.68)	1.48 (0.74–2.93)	0.77 (0.27–2.19)
2	1.50 (1.03–2.21)	1.11 (0.79–1.56)	1.36 (0.92–2.02)	2.22 (1.16–4.26)	2.00 (0.71–5.66)
3	1.73 (1.16–2.56)	1.24 (0.87–1.77)	1.53 (1.02–2.31)	2.41 (1.24–4.70)	3.58 (1.24–10.3)
4	2.16 (1.40–3.33)	1.19 (0.82–1.71)	1.85 (1.19–2.87)	3.49 (1.72–7.06)	4.74 (1.54–14.6)
<i>P for trend</i>	<0.001	0.288			
<i>Interpersonal relations</i>					
0	Ref.	Ref.	Ref.	Ref.	Ref.
1	1.08 (0.78–1.49)	0.92 (0.69–1.22)	1.16 (0.85–1.60)	0.80 (0.40–1.61)	1.05 (0.50–2.23)
2	1.35 (0.98–1.86)	1.20 (0.88–1.63)	1.36 (1.00–1.86)	1.28 (0.64–2.56)	1.75 (0.82–3.71)
3	1.68 (1.20–2.34)	1.20 (0.89–1.62)	1.70 (1.23–2.35)	1.47 (0.72–3.00)	2.38 (1.12–5.06)
4 or 5	2.19 (1.57–3.06)	1.17 (0.87–1.58)	2.15 (1.55–2.99)	2.10 (1.07–4.12)	3.64 (1.65–8.01)
<i>P for trend</i>	<0.001	0.077			
<i>Work-individual interface</i>					
0	Ref.	Ref.	Ref.	Ref.	Ref.
1	1.27 (0.92–1.76)	0.87 (0.67–1.14)	1.37 (1.00–1.87)	0.92 (0.45–1.87)	1.26 (0.60–2.63)
2	1.45 (1.06–1.99)	0.95 (0.72–1.24)	1.52 (1.12–2.04)	1.16 (0.58–2.36)	1.77 (0.87–3.60)
3	1.91 (1.39–2.63)	1.23 (0.93–1.61)	1.87 (1.38–2.53)	1.75 (0.87–3.52)	3.55 (1.66–7.61)
4 or 5	2.39 (1.63–3.51)	1.04 (0.78–1.40)	2.26 (1.57–3.26)	2.45 (1.05–5.70)	4.16 (1.72–10.1)
<i>P for trend</i>	<0.001	0.179			
<i>Workplace violence</i>					
0	Ref.	Ref.	Ref.	Ref.	Ref.
1	1.31 (1.05–1.63)	1.06 (0.88–1.28)	1.28 (1.03–1.59)	1.19 (0.76–1.86)	2.14 (1.28–3.59)
2	1.80 (1.41–2.29)	1.14 (0.94–1.39)	1.59 (1.25–2.02)	2.27 (1.38–3.74)	5.65 (3.16–10.1)
<i>P for trend</i>	<0.001	0.186			

TABLE 5 (Continued)

Factor domain Number of exposures ^a	Hurdle mixed effects models		Multinomial mixed effects models (0 as reference category)		
	Binary logistic model	Negative binomial model	Number of sickness absence spells		
	At least 1 sickness absence day OR (95% CI)	Total number of days of sickness absence RR (95% CI)	1 RR (95% CI)	2 RR (95% CI)	≥3 RR (95% CI)
<i>All psychosocial work factors^b</i>					
Q1	Ref.	Ref.	Ref.	Ref.	Ref.
Q2	1.67 (1.28–2.16)	1.07 (0.86–1.34)	1.70 (1.31–2.19)	1.50 (0.83–2.70)	1.97 (1.05–3.71)
Q3	1.90 (1.47–2.46)	1.03 (0.82–1.30)	1.94 (1.50–2.51)	1.48 (0.90–2.43)	2.75 (1.53–4.92)
Q4	2.46 (1.91–3.18)	1.25 (1.01–1.55)	2.21 (1.72–2.84)	2.99 (1.82–4.92)	6.37 (3.39–12.0)
<i>P for trend</i>	<0.001	0.065			
Factors related to working time/hours					
0	Ref.	Ref.	Ref.	Ref.	Ref.
1	0.98 (0.78–1.22)	1.05 (0.87–1.27)	1.01 (0.81–1.26)	0.85 (0.57–1.28)	0.80 (0.50–1.28)
2	1.18 (0.81–1.71)	1.05 (0.80–1.38)	1.23 (0.85–1.77)	0.78 (0.42–1.45)	1.39 (0.47–4.11)
3 or 4	1.93 (0.88–4.24)	1.19 (0.48–2.94)	1.88 (0.88–4.00)	2.76 (0.66–11.5)	0.30 (0.05–1.70)
<i>P for trend</i>	0.080	0.709			
Physical work exposures					
0	Ref.	Ref.	Ref.	Ref.	Ref.
1	1.29 (1.02–1.64)	1.32 (1.08–1.61)	1.22 (0.96–1.54)	1.52 (0.97–2.40)	1.80 (1.04–3.10)
2	1.67 (1.29–2.16)	1.24 (1.00–1.55)	1.59 (1.23–2.06)	1.89 (1.21–2.94)	2.76 (1.40–5.43)
3	1.92 (1.40–2.65)	1.38 (1.08–1.76)	1.78 (1.30–2.45)	2.04 (1.18–3.55)	4.21 (2.16–8.21)
4	3.04 (1.84–5.02)	1.70 (1.12–2.60)	2.57 (1.55–4.25)	4.76 (2.18–10.4)	8.16 (2.18–30.6)
<i>P for trend</i>	<0.001	0.014			

Note: Adjustment for age, marital status, occupation, economic activity and follow-up time period. OR and RR in bold were significant at $p < 0.05$.

Abbreviations: CI, confidence interval; OR, odds ratio; RR, rate ratio.

^aMultiple exposure was assessed by counting the number of occupational exposures for each factor domain, unless otherwise specified.

^bQuartiles of the total number of psychosocial work exposures.

absence. Many psychosocial work factors predicted the risk of at least 1 day of sickness absence, especially among women. Psychosocial work factors were more likely to predict the number of sickness absence spells than the number of sickness absence days. Physical work exposures were predictive of the number of spells and days of sickness absence, whereas shift work among women predicted the risk of at least 1 day of sickness absence. The study underlined dose–response associations between multiple psychosocial exposures and sickness absence spells, and between multiple physical exposures and sickness absence spells and days. To conclude, our findings emphasized that comprehensive prevention policies oriented toward the whole work environment should help to reduce sickness absence.

AUTHOR CONTRIBUTIONS

Sandrine Bertrais participated in the design of the study, statistical analysis and interpretation of the results, performed the literature

review, drafted and revised the manuscript. Elodie Pineau conducted the statistical analysis, prepared the presentation of the results and participated in the interpretation of the results and manuscript revision. Isabelle Niedhammer initiated the study protocol, participated in the interpretation of the results and revised the manuscript critically for important intellectual content. All authors read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

ACKNOWLEDGMENTS

The authors thank the members of the DARES (French ministry of labour) and all the participants to the national working conditions survey. Grant sponsor: DARES of the French ministry of labour; Grant number: 2018/037.

CONFLICT OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest.

DISCLOSURE BY AJIM EDITOR OF RECORD

John Meyer declares that he has no conflict of interest in the review and publication decision regarding this article.

DATA AVAILABILITY STATEMENT

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

ETHICS APPROVAL AND INFORMED CONSENT

The survey was approved by French ethics committees (CNIL no 2015-079 and CNIS no 2015X073TV). All who were included in the sample agreed to participate in the survey, and signed informed consent. All methods were carried out in accordance with relevant guidelines and regulations.

ORCID

Sandrine Bertrais  <http://orcid.org/0000-0001-7388-0916>

Isabelle Niedhammer  <https://orcid.org/0000-0002-8042-8925>

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Bertrais S, Pineau E, Niedhammer I. Prospective associations of psychosocial work factors with sickness absence spells and duration: results from the French national working conditions survey. *Am J Ind Med*. 2023;66:938-951. doi:10.1002/ajim.23526