**Absenteeism in healthcare workers: results from the nationwide AMADEUS survey.**

Running title: professional and individual factors associated with absenteeism in healthcare workers

Guillaume FOND\*1,2, Guillaume LUCAS1, Laurent BOYER1,2

1 Assistance Publique des Hôpitaux de Marseille, Aix-Marseille University, CEReSS-Health Service Research and Quality of Life Center, 27, boulevard Jean -Moulin, 13005 Marseille, France

2 Fondation FondaMental, Créteil, France

**\* corresponding author** e-mail: guillaume.fond@gmail.com

**Contributors.**

Concept and design: Guillaume Lucas, Laurent Boyer, Guillaume Fond.

Acquisition and analysis: Guillaume Lucas, Guillaume Fond.

Interpretation of data: Guillaume Fond

Drafting of the manuscript: Guillaume Fond.

Critical revision of the manuscript for important intellectual content: All the authors.

Statistical analysis: Guillaume Fond.

Supervision: Guillaume Fond.

Acknowledgments. We express all our thanks to the institutions and professional associations, which participated in the diffusion of the survey. We thank the following institutions/facilities for their participation in the dissemination of the study : regional health agencies: Provence Alpes Côte d'Azur, Brittany, Ile de France, GHT : Alps, Dauphiné, Rhône center, South Drôme, Ardèche, Western Brittany, South Brittany, Upper Brittany, South Corsica, South Val d'Oise, North Hauts-de-Seine, Ile de France, South Vaucluse, Var, Alpes-de-Haute-Provence, Bouches-du-Rhône, Alpes Maritimes, Southern Alps, Academic hospitals: Assistance publique Hôpitaux de Marseille, Assistance publique Hôpitaux de Paris, Hospices civils de Lyon, CHU d 'Amiens, CHU d 'Angers, CHU de Besancon, CHU de Bres,t CHRU de Caen, CHU de Clermont-Ferrand, CHU de Dijon, CHU de Grenoble, CHU of Lille, CHU of Limoges, CHU of Martinique, CHU of Montpellier, CHRU of Nancy, CHU of Nantes, CHU of Pointe-à-Pitre/Les Abymes, CHU of Reims, CHU of Rennes, CHU of La Reunion, CHU of Rouen, CHU of Saint-Étienne, CHU of Toulouse, CHRU of Tours, Private hospitals: Angers: Institut de cancérologie de l'Ouest Bordeaux: Institut Bergonié Caen: Centre François Baclesse Clermont-Ferrand: Centre Jean Perrin Dijon: Centre George-François Leclerc Lille: Centre Oscar Lambret Lyon: Centre Léon Bérard Marseille: Institut Paoli-Calmettes Nice: Centre Antoine Lacassagne, Associations : French National Association of Occupational Therapists, National Association of Graduate Nurses and Students, French association of dieticians nutritionists, French association of care managers, Professional association of midwives, Committee of agreement of the nursing training and executives, National College of Physiotherapy Fédération hospitalière de France, Fédération nationale des associations d'aides-soignants, Syndicat national des infirmiers anesthésistes, Syndicat national des infirmiers de bloc opératoire.

Word count: 3036 words.

**Abstract**

**Aim**. We seek to determine modifiable and nonmodifiable professional and individual factors associated with absenteeism to guide effective interventions for nurse managers to implement at the organizational level.

**Background**. Absenteeism induces vicious cycles of burnout and turnover in health care workers, resulting in high costs and disorganization in health care systems. Many factors have been identified in separate studies, but some individual and professional factors have not been explored. No comprehensive large-scale study of a comprehensive set of factors has been performed to date.

**Methods**. A survey was sent to public and private national health care facilities at a national level and through emails to professional associations and social networks. Absenteeism was defined by reporting ≥8 unworked days (except for vacations) within the past 12 months. Individual and professional factors were reported as binary variables or using standardized scales.

**Results**. A total of 10,325 participants (including 2819 nurses) were recruited, of whom 2129 (20.6%) were classified into the absenteeism group. A total of 24% of nurses were classified in the absenteeism group; this value was lower than that noted for nurse assistants (>30%) but higher than that noted for health executives (18%) and physicians (14%). When analyses were limited to nurses, the following associations remained significant in multivariate analyses: history of recurrent major depression (adjusted odds ratio aOR=1.431, p=0.004); chronic illness (aOR=1.483, p=0.001); overweight/obesity (aOR=1.341, p=0.002); sleep duration (aOR=0.891, p=0.001); motivation deficit (aOR=1.261, p=0.037); hospital vs. medico-social facility (aOR=0.752, p=0.213); adult psychiatry (aOR=1.308, p=0.033); use of skills (aOR=0.957, p=0.021); emotional support from colleagues (aOR=0.836, p=0.001); emotional exhaustion (aOR=1.304, p=0.025); and sustained bullying at the workplace (aOR=1.297, p=0.010).

**Conclusion**. Absenteeism is frequent in nurses, representing a major challenge for all nurse managers and more widely for all managers of health care workers.

**Implications for nursing management**. The present results suggest that nurse managers may prevent absenteeism by promoting programs to detect and prevent emotional exhaustion and workplace bullying (the most frequent factors identified in 40% and 50% of health care workers, respectively), reduce overweight/obesity, address motivation deficits, and detect inadequately treated recurrent major depression and chronic illness in nurses.

**Keywords:** mental health; psychiatry; public health; health services research; absenteeism.

**1. Introduction**

The absenteeism of health care workers is a chronic issue in multiple countries. In 2009, the only systematic review in the field published to date concluded that “Reasons underlying absenteeism among staff nurses [were] still poorly understood”(Davey *et al.*, 2009). More than 13 years later, the costs of health and work environment problems to organizations still exceed the worker’s wage (Strömberg *et al.*, 2017), and absenteeism causes many organizational issues that impede the continuity and quality of care (Duclay *et al.*, 2015). Absenteeism contributes to increased speed and quantity, fragmentation and unpredictability of care, inducing burnout, demotivation, turnover and absenteeism as part of a vicious cycle (Daouk-Öyry *et al.*, 2014; Castle and Ferguson-Rome, 2015; Roussillon Soyer *et al.*, 2021). Budget/effective restrictions in all countries(Chênevert *et al.*, 2013) and the COVID-19 crisis (Chin *et al.*, 2020; Groenewold *et al.*, 2020) have worsened this phenomenon.

Although some risk or protective factors of absenteeism have been identified in some isolated and small sample studies, no study has included all modifiable and nonmodifiable individual and professional factors that may be associated with absenteeism in the same analysis to understand the role of each of these factors. Our hypotheses were that among nonmodifiable individual factors, female sex, chronic illness(Considine *et al.*, 2011; Jinnett *et al.*, 2017; Tracera *et al.*, 2020; Alban, de Carvalho and Carvalho, 2021; França, Fernandes and Lima, 2021; Kunrath *et al.*, 2021; Tanaka *et al.*, 2022), being a parent and having a partner (or being separated) (Vialatte *et al.*, 2022), being a family caregiver(Brook, Rajagopalan and Smeeding, 2018) and depression (Alban, de Carvalho and Carvalho, 2021; Challener *et al.*, 2021; Docksey *et al.*, 2022) were risk factors for absenteeism. Among individual modifiable factors, we hypothesized that obesity, alcohol use disorders and low physical activity were risk factors for absenteeism based on the results of several studies (Huang *et al.*, 2020; López-Bueno *et al.*, 2020; Ramasamy *et al.*, 2020; Parsley *et al.*, 2022).

Absenteeism is not limited to individual factors. We hypothesized that work in some departments may increase the risk of absenteeism (emergency care(Considine *et al.*, 2011; Kunrath *et al.*, 2021), critical care(Inoue *et al.*, 2008), geriatrics(Castle and Ferguson-Rome, 2015; Vialatte *et al.*, 2022) and psychiatric care(Vialatte *et al.*, 2022)). We also hypothesized that work environment (Considine *et al.*, 2011; Burmeister *et al.*, 2019; Heistad *et al.*, 2022) and burnout (Diestel and Schmidt, 2011; Schouteten, 2017; Dyrbye *et al.*, 2019) were strong risk factors for absenteeism.

The AMADEUS (« *AMéliorer l’ADaptation à l’Emploi pour limiter la soUffrance des Soignants* »/« *improve employment adaptation to limit caregiver stress* ») study is a cross-sectional survey administered in French public and private health care facilities at a national level in France between May 2, 2021 and June 30, 2021. This survey had multiple goals, including determining the prevalence and the associated factors of multiple health or work outcomes. The results for major depression have already been published(Fond *et al.*, 2022).

The objective of the present work, which was performed using the same database, was to determine the modifiable and nonmodifiable individual and professional factors associated with absenteeism in health care workers to help health care workers managers prevent absenteeism and identify subgroups at risk of absenteeism. The secondary objective was to determine whether the factors associated with absenteeism were the same in specific subgroups of nurses to guide effective nurse management.

**2. Population and methods**

**2.1 Study population**

Design. This survey was supported by professional health care worker associations and the directions of the health care settings in which the survey was disseminated. The detailed protocol has been published (Lucas *et al.*, 2021). The recruitment and sampling methods are presented in Supplementary Annex 1.

Inclusion criteria. The participants were graduated health care workers currently working in a French public or private health facility.

Exclusion criteria. As the purpose was to evaluate the work environment, health care workers working in their private office were not included.

**2.2 Collected data**

*Absenteeism*

As absenteeism follows seasonal and daily trends(Ticharwa, Cope and Murray, 2019), absenteeism was defined as a binary variable using the following question: “How many unworked days (except vacations) did you have during the last 12 months?”. The participants reporting ≥8 unworked days were classified into the absenteeism group (those with one to eight unworked days were considered short-term absenteeism due to benign injury or infection).

*Individual nonmodifiable factors*

Age was reported as a continuous variable (years). The following binary variables were reported: sex, presence of a partner at home, presence of children at home, being a family caregiver (defined as a person who provides regular direct support to another person for self-care, administrative management or other activities of daily living), history of recurrent major depression (defined by history of 3 or more lifetime major depressive episodes including the potential current one), and having an ongoing chronic illness (defined by requiring long-term treatment).

*Individual modifiable factors*

Overweight/obesity (defined by body mass index ≥25 kg/m2), hard smoking (defined by daily tobacco smoking ≥20 cigarettes/day), hazardous drinking (defined by a CAGE questionnaire score ≥2 (Rueff, Crnac and Darne, 1989)), and moderate to vigorous physical activity using six items of the French version of the International Physical Activity Questionnaire (IPAQ) (Crinière *et al.*, 2011)). The IPAQ is the most widely used questionnaire to capture physical activity(World Health Organization, 2021) with Cronbach's α = 0.73 (Mannocci *et al.*, 2010). In this questionnaire, the weekly duration of physical activity was self-reported by 6 items evaluating the intensity, duration and weekly frequency of 3 levels of physical activity: mild, moderate and intense levels(Mannocci *et al.*, 2010). A weekly duration ≥150 min of moderate-vigorous physical activity was classified as an adequate physical activity level based on the World Health Organization recommendations(World Health Organization, 2021). Mean sleep duration (hours) was reported as a continuous variable using the dedicated item of the French version of the Pittsburgh Sleep Quality Index (PSQI) (Ait-Aoudia *et al.*, 2013). The 10-item PSQI has shown satisfactory validity and reliability with a Cronbach's α = 0.73 and good convergent validity with emotional problems (moderate-to-large positive correlations with CES-D, r = 0.58) (Blais *et al.*, 1997; Raniti *et al.*, 2018). Motivation deficits were reported based on the PSQI item exploring motivation deficit (ranking from 0/no motivation deficit to 3/severe motivation deficit, a cut-off ≥2 (i.e., moderate-to-severe motivation deficit) was chosen to identify health care workers with motivation deficit).

*Professional nonmodifiable factors*

The professional category included five modalities: health executive, nurse, nurse assistant, physicians and other profession. The following work characteristics were reported as binary variables: public sector vs. private sector, hospital vs. medico-social facility, COVID-19 department, emergency department, geriatrics department, palliative care, adult psychiatry department, childhood psychiatry department, critical care department, full-time job, night work, night shift, planned schedules (defined by the true working schedule being the same as the roster over the last two weeks), and constant schedules.

*Professional modifiable factors*

The work environment was explored using the job content questionnaire (Niedhammer, 2002). The ten dimensions comprising 26 items were reported as continuous scores: speed and quantity (3 items), complexity and intensity (3 items), fragmentation and unpredictability (3 items), decision-making latitude (3 items), use of skills (3 items), skill development (3 items), professional support by superiors (2 items), professional support by colleagues (2 items), emotional support by superiors (2 items), and emotional support by colleagues (2 items). Higher scores were associated with poorer work conditions except for decision-making latitude, use of skills and skill development. All factor dimensions had a satisfactory Cronbach’s alpha ≥0.65 (Niedhammer *et al.*, 2006). Convergent validity tests confirmed the expected association with key variables, including age, work status, sector of activity, occupation, job satisfaction, perception of job stress, and intent to change job (Niedhammer *et al.*, 2006). The fear of medical error was defined using the frequency item “How often are you afraid of making a medical mistake at work?”. Participants responding “at least once a week” were classified into the “fear of error” group. The three dimensions of burnout syndrome were included based on the French version of the 22-item Maslach Burnout Inventory (MBI) scale(Maslach, Schaufeli and Leiter, 2001). This 22-item scale has shown satisfactory psychometric properties(Langevin, 2012). The Cronbach’s alpha coefficients for the three dimensions of the MBI are greater than 0.70 (0.09 for emotional exhaustion (9 items), 0.79 for depersonalization (5 items), and 0.71 for personal accomplishment (8 items)) (Langevin, 2012). The stability coefficients are 0.82 and 0.80 at 2-4 weeks and one year, respectively (Langevin, 2012). The cut-offs used were ≥30 for emotional exhaustion, ≥12 for depersonalization and ≥40 for personal accomplishment, as recommended by the authors (Maslach, Schaufeli and Leiter, 2001). A history of lifetime sustained bullying at work, sexual harassment and sexual-based orientation discrimination were explored based on the definitions of French law used in our previous studies (Duba, Messiaen, Boulangeat, Boucekine, *et al.*, 2020; Duba, Messiaen, Boulangeat, Korchia, *et al.*, 2020; Duba, Messiaen, Masson, *et al.*, 2020; Messiaen *et al.*, 2020, 2021) and reported as binary variables.

*Geographical coverage*

To ensure correct geographical coverage, the postal code was reported. The postal codes were reported by region (Auvergne-Rhône-Alpes, Bourgogne-Franche-Comté, Bretagne, Centre-Val de Loire, Corse, Grand Est, Hauts-de-France, Ile-de-France, Normandie, Nouvelle-Aquitaine, Occitanie, Pays de la Loire, and Provence-Alpes-Côte d’Azur).

**2.3 Statistical analysis**

All variables were presented using measures of means and dispersion (standard deviation) for continuous data and frequency distribution for categorical variables. Comparisons between health care workers with absenteeism and those without were performed using the chi-square test for categorical variables. All continuous variables were analyzed with Student’s t-tests for normal distribution data. As detailed in the rationale, the present study was hypothesis-driven; therefore, no correction for multiple testing was performed (Bender and Lange, 2001).

Multivariate logistic regression models were employed to identify factors were associated with an increased risk of absenteeism. The variables associated with absenteeism with a p value <0.20 in the univariate analyses were included in the multivariate model. A subgroup analysis was performed in the nurse subgroup to determine whether some factors were specific to nurses.

**2.4 Ethical considerations**

The study was performed in accordance with ethical principles for medical research involving humans (WMA, Declaration of Helsinki) and French Jardé law. This survey was approved by the National Ethical Committee (IRB n°C08/21.01.06.93911, CNIL). All data were collected anonymously. As this study was voluntary and anonymous, no written informed consent was needed, and the participants were informed that clicking on the first page of the questionnaire was equivalent to providing their consent to participate. Participants were also informed that they could stop the survey at any time and revoke their participation.

**2.5 Funding**

No funding.

**3. Results**

A total of10,325 health care workers were recruited (1969 (19.1%) physicians, 1768 (17.1%) health executives, 2819 (27.3%) nurses, 847 (8.2%) assistant nurses and 2922 (28.3%) other allied health professionals (AHP)). The mean age was 42.3 years (standard deviation (SD): 10.84), and 1989 (19.3%) were men. A total of 2129 (20.6%) respondents were classified into the absenteeism group. The proportion of absenteeism based on professional category is presented in **Table 1**. Nursery assistants, psychomotricians, and nurse assistants were the three professions with the highest absenteeism rates (>30%) (nurses, 24%; health executives, 18%; physicians, 14%; and health director, 10%). The Cronbach's α coefficient was high for the MBI burnout dimensions (emotional exhaustion α=0.91, personal accomplishment α=0.77, and depersonalization α=0.72).

The geographical coverage of the survey was satisfactory and is presented in **Figure 1**. All regional territories were represented with between 251 and 1573 respondents, which is consistent with the demographic repartition of the general population in France.

The factors associated with absenteeism are presented in **Table 2**. When the 95% confidence intervals of the adjusted odds ratio are strictly greater than 1, the factor is considered to be significantly associated with an increased risk of absenteeism (with no causal relationship, given the cross-sectional nature of our data). In multivariate analyses, increased absenteeism was associated with the following:

-Nonmodifiable factors: having children at home [adjusted odds ratio (aOR)= 1.131 (1.012-1.263), p=0.030]; history of recurrent major depression [aOR=1.493 (1.308-1.704), p<0.001]; and having a chronic illness [aOR=1.603 (1.413-1.819), p<0.001].

-Modifiable factors: overweight/obesity [aOR= 1.322 (1.191-1.468), p<0.001]; sleep duration [aOR=0.942 (0.912-0.988), p=0.011]; motivation deficit [aOR=1.249 (1.107-1.409), p<0.001]; working in the COVID-19 department [aOR= 1.244 (1.051-1.471), p=0.011]; adult psychiatry [aOR=1.231 (1.069-1.418), p=0.004]; childhood psychiatry [aOR=1.538 (1.216-1.944), p<0.001]; emotional exhaustion [aOR=1.322 (1.161-1.506), p<0.001]; and sustained bullying at the workplace [aOR=1.352 (1.213-1.507), p<0.001].

The following factors were associated with lower absenteeism:

-Nonmodifiable factors: male sex [OR= 0.752 (0.653-0.865), p<0.001].

-Modifiable factors: fragmentation and unpredictability [aOR=0.959 (0.930-0.989), p=0.008]; use of skills [aOR=0.952 (0.933-0.971), p<0.001], emotional support by colleagues [aOR=0.928 (0.875-0.984), p=0.013], hospital vs. medico-social facility [aOR=0.795 (0.649-0.973), p=0.026], having a full-time job [aOR=0.798 (0.699-0.912), p<0.001], and night shift [aOR=0.848 (0.752-0.957), p=0.007].

When limiting the analyses to nurses (n=2819), the following associations remained significant: history of recurrent major depression [aOR=1.431 (1.175-1.873), p=0.004]; chronic illness [aOR=1.483 (1.175-1.873), p=0.001], overweight/obesity [aOR=1.341 (1.110-1.619), p=0.002], sleep duration [aOR=0.891 (0.831-0.956), p=0.001], motivation deficit [aOR=1.261 (1.014-1.568), p=0.037], hospital vs. medico-social facility [aOR=0.752 (0.480-1.177), p=0.213], adult psychiatry [aOR=1.308 (1.023-1.674), p=0.033]; use of skills [aOR=0.957 (0.921-0.993), p=0.021]; emotional support by colleagues [aOR=0.836 (0.750-0.931), p=0.001]; emotional exhaustion [aOR=1.304 (1.034-1.645), p=0.025]; and sustained bullying at the workplace [aOR=1.297(1.065-1.579), p=0.010]. Although the association was nonsignificant for health care workers, the nurses in the absenteeism group reported higher professional support from colleagues than those in the nonabsenteeism group [aOR=1.129 (1.001-1.274), p=0.049].

**4. Discussion**

Our results are summarized as follows. We included a comprehensive set of individual and professional factors potentially associated with absenteeism. We identified a set of factors associated with absenteeism shared between nurses and other health care workers. Professionals with a history of recurrent major depression, chronic illness, and those working in medico-social facilities and/or psychiatry departments are at increased risk of absenteeism. We also identified modifiable factors providing targets for intervention by nurse managers: preventing emotional exhaustion, sustained bullying at the workplace, and motivation deficits as well as promoting emotional support from colleagues and weight loss.

Overall, 43% of health care workers with absenteeism had overweight/obesity, and 23% had a history of recurrent major depression. These two factors had strong independent associations with absenteeism, independent of confounding factors, such as being a female or having a chronic illness (which are risk factors for recurrent major depression(Miller *et al.*, 1996; Šimunović Filipčić *et al.*, 2019)). Nurse managers may play a specific role in promoting a healthy diet, physical activity, mindfulness and tobacco cessation among members of their teams, as these interventions are effective in preventing depression relapses(Kim *et al.*, 2019; Korchia *et al.*, 2021; McCartney *et al.*, 2021). Depression and overweight/obesity have a strong bidirectional relationship (Frank *et al.*, 2022), suggesting that these factors could be targeted in common interventions. Sleep reduction was also associated with absenteeism. Reduced sleep may induce multiple physical and mental health issues, including overweight/obesity and depression. Promoting active rest or napping at work could be encouraged by nurse managers to prevent the risks associated with chronic sleep deprivation.

Contrary to that expected, speed, quantity, complexity, intensity, fragmentation, unpredictability, decision-making latitude, use of skills, and skill development were not significantly associated with absenteeism or with a negative and marginal effect. In contrast, we found that emotional exhaustion and sustained bullying at the workplace were strongly associated with absenteeism (these two last factors were reported in approximately 40% and 50% of the absenteeism group, respectively, with similar rates noted between nurses and other health care workers). Implementing strategies to systematically detect these phenomena could be developed at the management level. Similar to the patient-reported experience measures (PREMs)(Fernandes *et al.*, 2022), numeric tools could be developed to help health care workers report emotional exhaustion and sustained bullying at the workplace. Our results suggest that promoting professional and emotional support between nurses could represent an effective strategy for nurse managers to improve absenteeism in their teams.

*Limitations and perspectives.* These results should be interpreted with caution. These results should be replicated in other countries. It is probable that most of the identified factors associated with absenteeism do not depend on the country (e.g., recurrent major depression). However, their weighting may vary across countries. The Job Content Questionnaire has been developed and validated in multiple countries, enabling comparisons of work environments between countries independent of the health care system. The limits of this study are similar to those noted for other online surveys. Given the study’s cross-sectional design, no causal relationship can be drawn. The dissemination of the study to health care workers with a low hierarchical level was less effective due to the lack of use of professional mailing in most facilities. To limit the selection bias, the title of the study did not mention absenteeism but work adaptation. We may have underestimated the absenteeism rate, as all participants off work did not receive mail by professional mailings at the time of the survey. Despite a 2-month period of dissemination (including social networks) to counter this bias, we may have missed information on the long-term absenteeism. The private sector was underrepresented potentially due to less interest in research in the private sector, a greater lack of time or a reduced desire to evaluate work conditions in these facilities(Lucas *et al.*, 2022). However, we found no association between the private sector and absenteeism. Further studies should replicate these relationships in each professional category. In France, direct access to professional listings and/or mailings is limited, which limits the implementation of surveys. Thus, there is a need for nationally representative cohorts to monitor the health status of health care workers. However, our study has one of the largest sample sizes of Western countries in the field. This sample size was sufficient to perform robust analyses with adjustments for multiple confounding factors.

**5. Conclusion and implications for nursing management**

Nonmodifiable factors may help target some groups of health care workers as a priority to prevent or address absenteeism. Modifiable factors provide some content for interventions.

**6. Implications for nursing management**.

Absenteeism is a major challenge for all nurse managers and more widely for all managers of health care workers. The present results suggest that nurse managers may prevent absenteeism by promoting programs to detect and prevent emotional exhaustion and workplace bullying, reduce overweight/obesity, improve motivation deficits, and detect inadequately treated recurrent major depression and chronic illness in nurses.

**References**

Ait-Aoudia, M. *et al.* (2013) ‘Validation of the French version of the Pittsburgh Sleep Quality Index Addendum for posttraumatic stress disorder’, *European Journal of Psychotraumatology*, 4. Available at: https://doi.org/10.3402/ejpt.v4i0.19298.

Alban, L.L., de Carvalho, M. and Carvalho, A.C. (2021) ‘Reasons for sickness absenteeism among nursing workers in Brazil: an integrative review’, *Revista brasileira de medicina do trabalho: publicacao oficial da Associacao Nacional de Medicina do Trabalho-ANAMT*, 19(3), pp. 351–362. Available at: https://doi.org/10.47626/1679-4435-2021-629.

Bender, R. and Lange, S. (2001) ‘Adjusting for multiple testing—when and how?’, *Journal of Clinical Epidemiology*, 54(4), pp. 343–349. Available at: https://doi.org/10.1016/S0895-4356(00)00314-0.

Blais, F.C. *et al.* (1997) ‘[Evaluation of insomnia: validity of 3 questionnaires]’, *L’Encephale*, 23(6), pp. 447–453.

Brook, R.A., Rajagopalan, K. and Smeeding, J.E. (2018) ‘Healthcare Costs and Absenteeism Among Caregivers of Adults with Partial-Onset Seizures: Analysis of Claims from an Employer Database’, *American Health & Drug Benefits*, 11(8), pp. 396–403.

Burmeister, E.A. *et al.* (2019) ‘Determinants of nurse absenteeism and intent to leave: An international study’, *Journal of Nursing Management*, 27(1), pp. 143–153. Available at: https://doi.org/10.1111/jonm.12659.

Castle, N.G. and Ferguson-Rome, J.C. (2015) ‘Influence of Nurse Aide Absenteeism on Nursing Home Quality’, *The Gerontologist*, 55(4), pp. 605–615. Available at: https://doi.org/10.1093/geront/gnt167.

Challener, D.W. *et al.* (2021) ‘Healthcare personnel absenteeism, presenteeism, and staffing challenges during epidemics’, *Infection Control and Hospital Epidemiology*, 42(4), pp. 388–391. Available at: https://doi.org/10.1017/ice.2020.453.

Chênevert, D. *et al.* (2013) ‘The role of organisational justice, burnout and commitment in the understanding of absenteeism in the Canadian healthcare sector’, *Journal of Health Organization and Management*, 27(3), pp. 350–367. Available at: https://doi.org/10.1108/JHOM-06-2012-0116.

Chin, E.T. *et al.* (2020) ‘Projected geographic disparities in healthcare worker absenteeism from COVID-19 school closures and the economic feasibility of child care subsidies: a simulation study’, *BMC medicine*, 18(1), p. 218. Available at: https://doi.org/10.1186/s12916-020-01692-w.

Considine, J. *et al.* (2011) ‘Pandemic (H1N1) 2009 Influenza in Australia: Absenteeism and redeployment of emergency medicine and nursing staff’, *Emergency medicine Australasia: EMA*, 23(5), pp. 615–623. Available at: https://doi.org/10.1111/j.1742-6723.2011.01461.x.

Crinière, L. *et al.* (2011) ‘Reproducibility and validity of the French version of the long international physical activity questionnaire in patients with type 2 diabetes’, *Journal of Physical Activity & Health*, 8(6), pp. 858–865. Available at: https://doi.org/10.1123/jpah.8.6.858.

Daouk-Öyry, L. *et al.* (2014) ‘The JOINT model of nurse absenteeism and turnover: a systematic review’, *International Journal of Nursing Studies*, 51(1), pp. 93–110. Available at: https://doi.org/10.1016/j.ijnurstu.2013.06.018.

Davey, M.M. *et al.* (2009) ‘Predictors of nurse absenteeism in hospitals: a systematic review’, *Journal of Nursing Management*, 17(3), pp. 312–330. Available at: https://doi.org/10.1111/j.1365-2834.2008.00958.x.

Diestel, S. and Schmidt, K.-H. (2011) ‘The moderating role of cognitive control deficits in the link from emotional dissonance to burnout symptoms and absenteeism’, *Journal of Occupational Health Psychology*, 16(3), pp. 313–330. Available at: https://doi.org/10.1037/a0022934.

Docksey *et al.* (2022) ‘The Stigma and Self-Stigma Scales for attitudes to mental health problems: Psychometric properties and its relationship to mental health problems and absenteeism’, *Health psychology research*, 10(2). Available at: https://pubmed.ncbi.nlm.nih.gov/35928586/ (Accessed: 16 August 2022).

Duba, A., Messiaen, M., Boulangeat, C., Boucekine, M., *et al.* (2020) ‘Sexual harassment exposure and impaired mental health in medical students. The MESSIAEN national study’, *Journal of Affective Disorders*, 274, pp. 276–281. Available at: https://doi.org/10.1016/j.jad.2020.05.100.

Duba, A., Messiaen, M., Masson, M., *et al.* (2020) ‘[Sexual professional violence exposure of young physicians in the hospital: The MESSIAEN national study]’, *L’Encephale* [Preprint]. Available at: https://doi.org/10.1016/j.encep.2020.02.001.

Duba, A., Messiaen, M., Boulangeat, C., Korchia, T., *et al.* (2020) ‘Sexual-orientation based discrimination is associated with anxiety and depression in young physicians. A national study’, *Journal of Affective Disorders*, 274, pp. 964–968. Available at: https://doi.org/10.1016/j.jad.2020.05.155.

Duclay, E. *et al.* (2015) ‘Exploring the impact of staff absenteeism on patient satisfaction using routine databases in a university hospital’, *Journal of Nursing Management*, 23(7), pp. 833–841. Available at: https://doi.org/10.1111/jonm.12219.

Dyrbye, L.N. *et al.* (2019) ‘A cross-sectional study exploring the relationship between burnout, absenteeism, and job performance among American nurses’, *BMC nursing*, 18, p. 57. Available at: https://doi.org/10.1186/s12912-019-0382-7.

Fernandes, S. *et al.* (2022) ‘Development and Calibration of the PREMIUM Item Bank for Measuring Respect and Dignity for Patients with Severe Mental Illness’, *Journal of Clinical Medicine*, 11(6), p. 1644. Available at: https://doi.org/10.3390/jcm11061644.

Fond, G. *et al.* (2021) ‘Anxiety and depression in young physicians: Prevalence and associated factors. The MESSIAEN national study’, *L’Encephale*, pp. S0013-7006(21)00084–1. Available at: https://doi.org/10.1016/j.encep.2021.02.005.

Fond, G. *et al.* (2022) ‘Depression in healthcare workers: Results from the nationwide AMADEUS survey’, *International Journal of Nursing Studies*, 135, p. 104328. Available at: https://doi.org/10.1016/j.ijnurstu.2022.104328.

França, R.D.R., Fernandes, R. de C.P. and Lima, V.M.C. (2021) ‘Risk factors for absenteeism due to musculoskeletal diseases in workers in the judiciary sector’, *Revista brasileira de medicina do trabalho: publicacao oficial da Associacao Nacional de Medicina do Trabalho-ANAMT*, 19(4), pp. 454–464. Available at: https://doi.org/10.47626/1679-4435-2021-634.

Frank, P. *et al.* (2022) ‘Overweight, obesity, and individual symptoms of depression: A multicohort study with replication in UK Biobank’, *Brain, Behavior, and Immunity*, 105, pp. 192–200. Available at: https://doi.org/10.1016/j.bbi.2022.07.009.

Groenewold, M.R. *et al.* (2020) ‘Increases in Health-Related Workplace Absenteeism Among Workers in Essential Critical Infrastructure Occupations During the COVID-19 Pandemic - United States, March-April 2020’, *MMWR. Morbidity and mortality weekly report*, 69(27), pp. 853–858. Available at: https://doi.org/10.15585/mmwr.mm6927a1.

Heistad, A. *et al.* (2022) ‘How do intensive work environments affect nurses’ absenteeism and turnover intent?’, *Applied nursing research: ANR*, 66, p. 151608. Available at: https://doi.org/10.1016/j.apnr.2022.151608.

Huang, R. *et al.* (2020) ‘Exercise alone and exercise combined with education both prevent episodes of low back pain and related absenteeism: systematic review and network meta-analysis of randomised controlled trials (RCTs) aimed at preventing back pain’, *British Journal of Sports Medicine*, 54(13), pp. 766–770. Available at: https://doi.org/10.1136/bjsports-2018-100035.

Inoue, K.C. *et al.* (2008) ‘[The absenteeism-disease of a nursing team in an intensive care unit]’, *Revista Brasileira De Enfermagem*, 61(2), pp. 209–214. Available at: https://doi.org/10.1590/s0034-71672008000200010.

Jinnett, K. *et al.* (2017) ‘Chronic Conditions, Workplace Safety, And Job Demands Contribute To Absenteeism And Job Performance’, *Health Affairs (Project Hope)*, 36(2), pp. 237–244. Available at: https://doi.org/10.1377/hlthaff.2016.1151.

Kim, S.-Y. *et al.* (2019) ‘Physical activity and the prevention of depression: A cohort study’, *General Hospital Psychiatry*, 60, pp. 90–97. Available at: https://doi.org/10.1016/j.genhosppsych.2019.07.010.

Korchia, T. *et al.* (2021) ‘Recommendations of the treatment-resistant depression expert center network for promoting tobacco smoking cessation based on the results from the real-world FACE-TRD national cohort’, *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, p. 110479. Available at: https://doi.org/10.1016/j.pnpbp.2021.110479.

Kunrath, G.M. *et al.* (2021) ‘Predictors associated with absenteeism-disease among Nursing professionals working in an emergency hospital service’, *Revista Gaucha De Enfermagem*, 42, p. e20190433. Available at: https://doi.org/10.1590/1983-1447.2021.20190433.

Langevin (2012) ‘Maslach Burnout Inventory (MBI) - Article de revue - INRS’. Available at: https://www.inrs.fr/media.html?refINRS=FRPS%2026 (Accessed: 27 February 2022).

López-Bueno, R. *et al.* (2020) ‘Association between physical activity and sickness absenteeism in university workers’, *Occupational Medicine (Oxford, England)*, 70(1), pp. 24–30. Available at: https://doi.org/10.1093/occmed/kqz158.

Lucas, G. *et al.* (2021) ‘Risk factors for burnout and depression in healthcare workers: The national AMADEUS study protocol’, *L’Encephale*, pp. S0013-7006(21)00159–7. Available at: https://doi.org/10.1016/j.encep.2021.06.001.

Lucas, G. *et al.* (2022) ‘Work environment and mental health in nurse assistants, nurses and health executives: Results from the AMADEUS study’, *Journal of Nursing Management* [Preprint]. Available at: https://doi.org/10.1111/jonm.13599.

Mannocci, A. *et al.* (2010) ‘International Physical Activity Questionnaire: validation and assessment in an Italian sample’. Available at: https://doi.org/10.2427/5694.

Maslach, C., Schaufeli, W.B. and Leiter, M.P. (2001) ‘Job burnout’, *Annual Review of Psychology*, 52, pp. 397–422. Available at: https://doi.org/10.1146/annurev.psych.52.1.397.

McCartney, M. *et al.* (2021) ‘Mindfulness-based cognitive therapy for prevention and time to depressive relapse: Systematic review and network meta-analysis’, *Acta Psychiatrica Scandinavica*, 143(1), pp. 6–21. Available at: https://doi.org/10.1111/acps.13242.

Messiaen, M. *et al.* (2020) ‘Repeated bullying at the workplace in medical students and young doctors: the MESSIAEN national study’, *European Archives of Psychiatry and Clinical Neuroscience* [Preprint]. Available at: https://doi.org/10.1007/s00406-020-01144-9.

Messiaen, M. *et al.* (2021) ‘[Exposure to professional violence by young physicians in the hospital: MESSIAEN national study]’, *L’Encephale*, 47(2), pp. 114–122. Available at: https://doi.org/10.1016/j.encep.2020.05.020.

Miller, M.D. *et al.* (1996) ‘Chronic Medical Illness in Patients With Recurrent Major Depression’, *The American Journal of Geriatric Psychiatry: Official Journal of the American Association for Geriatric Psychiatry*, 4(4), pp. 281–290. Available at: https://doi.org/10.1097/00019442-199622440-00002.

Niedhammer, I. (2002) ‘Psychometric properties of the French version of the Karasek Job Content Questionnaire: a study of the scales of decision latitude, psychological demands, social support, and physical demands in the GAZEL cohort’, *International Archives of Occupational and Environmental Health*, 75(3), pp. 129–144. Available at: https://doi.org/10.1007/s004200100270.

Niedhammer, I. *et al.* (2006) ‘[Psychometric properties of the French version of Karasek’s “Job Content Questionnaire” and its scales measuring psychological pressures, decisional latitude and social support: the results of the SUMER]’, *Sante Publique (Vandoeuvre-Les-Nancy, France)*, 18(3), pp. 413–427. Available at: https://doi.org/10.3917/spub.063.0413.

Parsley, I.C. *et al.* (2022) ‘Association Between Workplace Absenteeism and Alcohol Use Disorder From the National Survey on Drug Use and Health, 2015-2019’, *JAMA network open*, 5(3), p. e222954. Available at: https://doi.org/10.1001/jamanetworkopen.2022.2954.

Ramasamy, A. *et al.* (2020) ‘Direct, Absenteeism, and Disability Cost Burden of Obesity Among Privately Insured Employees: A Comparison of Healthcare Industry Versus Other Major Industries in the United States’, *Journal of Occupational and Environmental Medicine*, 62(2), pp. 98–107. Available at: https://doi.org/10.1097/JOM.0000000000001761.

Raniti, M.B. *et al.* (2018) ‘Factor structure and psychometric properties of the Pittsburgh Sleep Quality Index in community-based adolescents’, *Sleep*, 41(6). Available at: https://doi.org/10.1093/sleep/zsy066.

Roussillon Soyer, C. *et al.* (2021) ‘The demotivating impact of absenteeism in nursing homes’, *Journal of Nursing Management*, 29(6), pp. 1679–1690. Available at: https://doi.org/10.1111/jonm.13314.

Rueff, B., Crnac, J. and Darne, B. (1989) ‘[Detection of alcoholic patients using the systematic CAGE autoquestionnaire. In out patients]’, *Presse Medicale (Paris, France: 1983)*, 18(33), pp. 1654–1656.

Schouteten, R. (2017) ‘Predicting absenteeism: screening for work ability or burnout’, *Occupational Medicine (Oxford, England)*, 67(1), pp. 52–57. Available at: https://doi.org/10.1093/occmed/kqw161.

Šimunović Filipčić, I. *et al.* (2019) ‘The effect of chronic physical illnesses on psychiatric hospital admission in patients with recurrent major depression’, *Psychiatry Research*, 272, pp. 602–608. Available at: https://doi.org/10.1016/j.psychres.2018.12.178.

Strömberg, C. *et al.* (2017) ‘Estimating the Effect and Economic Impact of Absenteeism, Presenteeism, and Work Environment-Related Problems on Reductions in Productivity from a Managerial Perspective’, *Value in Health: The Journal of the International Society for Pharmacoeconomics and Outcomes Research*, 20(8), pp. 1058–1064. Available at: https://doi.org/10.1016/j.jval.2017.05.008.

Tanaka, C. *et al.* (2022) ‘A Cross-Sectional Study of the Impact of Pain Severity on Absenteeism and Presenteeism Among Japanese Full-Time Workers’, *Pain and Therapy* [Preprint]. Available at: https://doi.org/10.1007/s40122-022-00408-7.

Ticharwa, M., Cope, V. and Murray, M. (2019) ‘Nurse absenteeism: An analysis of trends and perceptions of nurse unit managers’, *Journal of Nursing Management*, 27(1), pp. 109–116. Available at: https://doi.org/10.1111/jonm.12654.

Tracera, G. *et al.* (2020) ‘Factors associated with absenteeism of nursing professionals in university outpatient clinics in Brazil’, *Journal of Nursing Management*, 28(6), pp. 1259–1267. Available at: https://doi.org/10.1111/jonm.13073.

Vialatte, P. *et al.* (2022) ‘Mathematical Modeling of the Evolution of Absenteeism in a University Hospital over 12 Years’, *International journal of environmental research and public health*, 19(14). Available at: https://doi.org/10.3390/ijerph19148236.

World Health Organization (2021) *WHO guidelines on physical activity and sedentary behaviour*. Available at: https://www.who.int/publications-detail-redirect/9789240015128 (Accessed: 22 November 2021).

Table 1. Proportion of absenteeism according to profession (in decreased order of proportion of absenteeism). Only professions with a sample size ≥20 are presented.

|  |  |  |  |
| --- | --- | --- | --- |
| Professional status | Absenteeism (N) | Total (N) | Percentage of absenteeism |
|  |  |  |  |
| Total | 2129 | 10325 | 0.206 |
|  |  |  |  |
| Nursery assistant | 30 | 93 | 0.323 |
| Psychomotrician | 28 | 93 | 0.301 |
| Nurse assistant | 255 | 847 | 0.301 |
| Physiotherapist | 108 | 419 | 0.258 |
| Specialized educator | 22 | 86 | 0.256 |
| Occupational therapist | 73 | 306 | 0.239 |
| Nurse | 675 | 2819 | 0.239 |
| Administrative | 68 | 295 | 0.231 |
| Ambulance driver | 6 | 27 | 0.222 |
| Radiology manipulator | 31 | 142 | 0.218 |
| Laboratory technician | 30 | 138 | 0.217 |
| Social worker | 28 | 131 | 0.214 |
| Psychologist | 40 | 216 | 0.185 |
| Dietician | 18 | 99 | 0.182 |
| Health executive | 315 | 1768 | 0.178 |
| Midwife | 56 | 332 | 0.169 |
| Advanced practice nurse | 4 | 24 | 0.167 |
| Pharmacy assistant | 13 | 87 | 0.149 |
| Physician | 284 | 1969 | 0.144 |
| Speech therapist | 4 | 38 | 0.105 |
| Director of care | 11 | 105 | 0.105 |
| Pharmacist | 25 | 260 | 0.096 |
| Director | 2 | 21 | 0.095 |

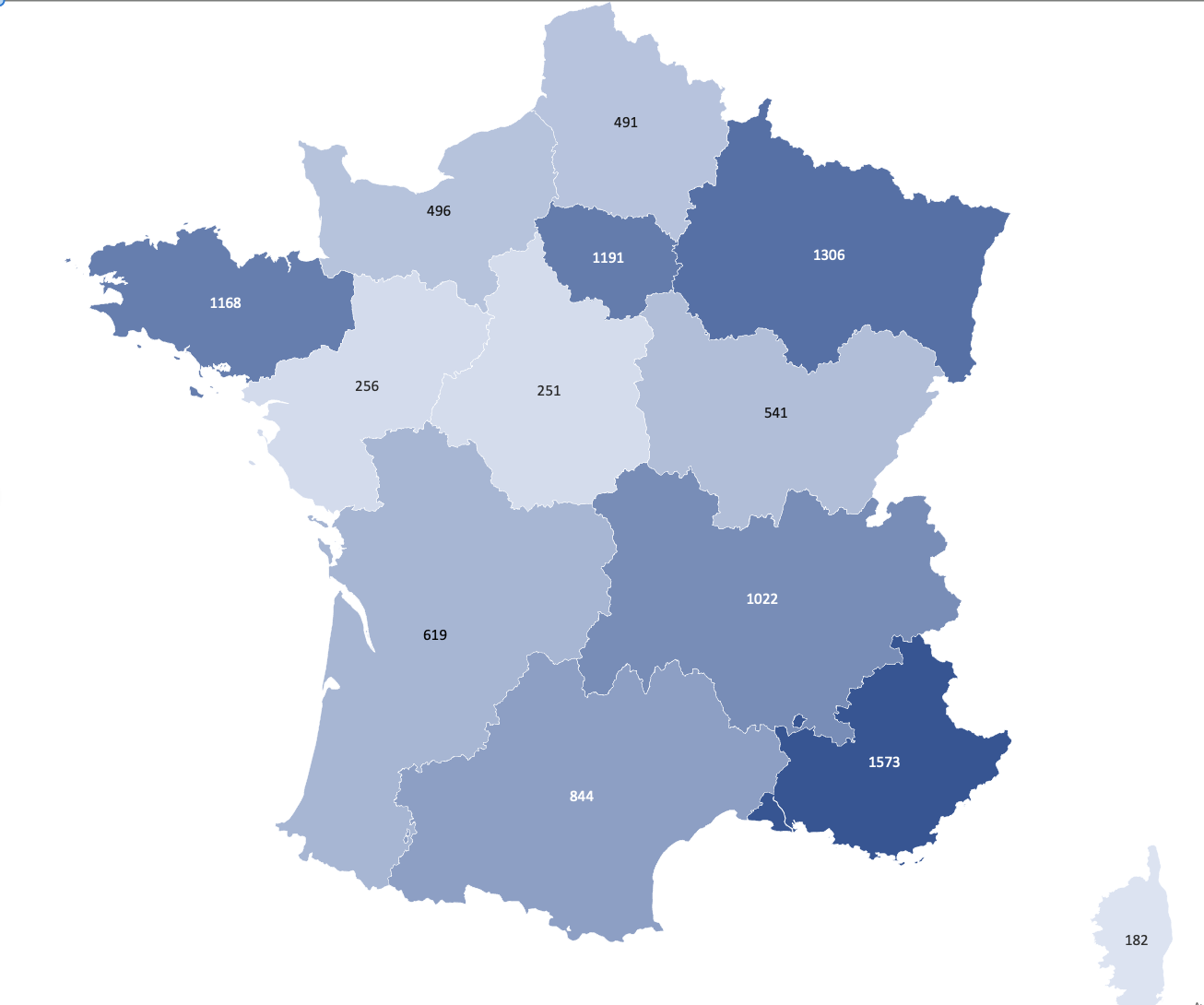
Table 2. Professional and individual factors associated with absenteeism (dependent variable).

|  | All health care workers (n=10,325) | | | | | Nurses (n=2819) | | | |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Individual and professional factors | Univariate model | |  | Multivariate model |  | Univariate model | |  | Multivariate model |  |  |  |  |  |
|  | No absenteeism  8196 (79.4%) | Absenteeism  2129 (20.6%) | p value | Adjusted\* odds ratio  (aOR) (95% CI) | p value | No absenteeism  2091 (76.1%) | Absenteeism  661 (23.9%) | p value | Adjusted\* odds ratio  (aOR) (95% CI) | p value |  |  |  |  |
| Individual factors |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Nonmodifiable factors** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Age (years) | 42.16 (10.90) | 42.83 (10.62) | 0.010 | 0.997 (0.991-1.002) | 0.176 | 40.22 (10.00) | 41.05 (10.15) | 0.060 | 1.000 (0.991-1.010) | 0.940 |  |  |  |  |
| **Sex (male)** | **1665 (20.3%)** | **324 (15.2%)** | **<0.001** | **0.752 (0.653-0.865)** | **<0.001** | 363 (16.9%) | 98 (14.5%) | 0.139 | 0.806 (0.620-1.047) | 0.106 |  |  |  |  |
| Partner at home | 6135 (74.9%) | 1557 (73.1%) | 0.105 | 0.940 (0.833-1.060) | 0.316 | 1621 (75.6%) | 489 (72.4%) | 0.099 | 0.889 (0.722-1.094) | 0.266 |  |  |  |  |
| **Children at home** | **4742 (57.9%)** | **1310 (61.5%)** | **0.002** | **1.131 (1.012-1.263)** | **0.030** | 1340 (62.5%) | 430 (63.7%) | 0.573 |  |  |  |  |  |  |
| Family caregiver | 1434 (17.5%) | 442 (22.8%) | 0.0001 | 1.065 (0.938-1.209) | 0.332 | 393 (18.3%) | 141 (20.9%) | 0.139 | 1.020 (0.809-1.285) | 0.869 |  |  |  |  |
| **History of recurrent major depression** | **1023 (12.5%)** | **486 (22.8%)** | **<0.001** | **1.493 (1.308-1.704)** | **<0.001** | **261 (12.2%)** | **148 (21.9%)** | **<0.001** | **1.431 (1.175-1.873)** | **0.004** |  |  |  |  |
| **Chronic illness** | **1161 (14.2%)** | **513 (24.1%)** | **<0.001** | **1.603 (1.413-1.819)** | **<0.001** | **304 (14.2%)** | **155 (23.0%)** | **<0.001** | **1.483 (1.175-1.873)** | **0.001** |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Modifiable factors** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Overweight/obesity** | **2816 (34.4%)** | **910 (42.7%)** | **<0.001** | **1.322 (1.191-1.468)** | **<0.001** | **771 (36.0%)** | **304 (45.0%)** | **<0.001** | **1.341 (1.110-1.619)** | **0.002** |  |  |  |  |
| Smoker | 1664 (20.3%) | 451 (21.2%) | 0.369 |  |  | 524 (24.4%) | 170 (25.2%) | 0.695 |  |  |  |  |  |  |
| Hazardous drinking | 1518 (18.5%) | 407 (19.1%) | 0.529 |  |  | 353 (16.5%) | 117 (17.3%) | 0.597 |  |  |  |  |  |  |
| Moderate to high physical activity | 5121 (62.5%) | 1271 (59.7%) | 0.019 | 1.035 (0.932-1.148) | 0.523 | 1389 (64.8%) | 405 (60.0%) | 0.023 | 0.914 (0.756-1.105) | 0.353 |  |  |  |  |
| **Sleep duration (hours)** | **6.66 (1.24)** | **6.45 (1.41)** | **<0.001** | **0.942 (0.912-0.988)** | **0.011** | **6.61 (1.35)** | **6.31 (1.36)** | **<0.001** | **0.891 (0.831-0.956)** | **0.001** |  |  |  |  |
| **Motivation deficit** | **2190 (26.7%)** | **840 (39.5%)** | **<0.001** | **1.249 (1.107-1.409)** | **<0.001** | **599 (27.9%)** | **276 (40.9%)** | **<0.001** | **1.261 (1.014-1.568)** | **0.037** |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Professional factors |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Nonmodifiable factors** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Public sector vs. private sector | 7947 (97.0%) | 2075 (97.5%) | 0.222 |  |  | 2091 (97.5%) | 661 (97.9%) | 0.554 |  |  |  |  |  |  |
| **Hospital vs. medico-social facility** | **7746 (94.5%)** | **1955 (91.8%)** | **0.010** | **0.795 (0.649-0.973)** | **0.026** | **2072 (96.6%)** | **637 (94.4%)** | **0.008** | **0.752 (0.480-1.177)** | **0.213** |  |  |  |  |
| Professional category |  |  | 0.327 |  |  |  |  |  |  |  |  |  |  |  |
| Health executive | 1375 (16.8%) | 393 (18.5%) |  |  |  |  |  |  |  |  |  |  |  |  |
| Nurse | 2238 (27.3%) | 581 (27.3%) |  |  |  |  |  |  |  |  |  |  |  |  |
| Nurse assistant | 687 (8.4%) | 160 (7.5%) |  |  |  |  |  |  |  |  |  |  |  |  |
| Physicians | 1565 (19.1%) | 404 (19.0%) |  |  |  |  |  |  |  |  |  |  |  |  |
| Other profession | 2331 (28.4%) | 591 (27.8%) |  |  |  |  |  |  |  |  |  |  |  |  |
| **Covid-19 department** | **716 (8.7%)** | **230 (10.8%)** | **0.003** | **1.244 (1.051-1.471)** | **0.011** | 230 (10.7%) | 84 (12.4%) | 0.216 |  |  |  |  |  |  |
| Emergency department | 466 (5.7%) | 119 (5.6%) | 0.864 |  |  | 181 (8.4%) | 56 (8.3%) | 0.905 |  |  |  |  |  |  |
| Geriatrics | 756 (9.2%) | 241 (11.3%) | 0.004 | 1.114 (0.939-1.321) | 0.215 | 155 (7.2%) | 59 (8.7%) | 0.196 | 1.064 (0.747-1.514) | 0.732 |  |  |  |  |
| Palliative care | 334 (4.1%) | 97 (4.6%) | 0.323 |  |  | 117 (5.5%) | 34 (5.0%) | 0.673 |  |  |  |  |  |  |
| **Adult psychiatry** | **1101 (13.4%)** | **352 (16.5%)** | **<0.001** | **1.231 (1.069-1.418)** | **0.004** | **371 (17.3%)** | **152 (22.5%)** | **0.002** | **1.308 (1.023-1.674)** | **0.033** |  |  |  |  |
| **Childhood psychiatry** | **301 (3.7%)** | **114 (5.4%)** | **<0.001** | **1.538 (1.216-1.944)** | **<0.001** | 64 (3.0%) | 28 (4.1%) | 0.138 | 1.607 (0.983-2.628) | 0.059 |  |  |  |  |
| Critical care | 677 (8.3%) | 167 (7.8%) | 0.532 |  |  | 296 (13.8%) | 76 (11.3%) | 0.088 | 0.938 (0.699-1.259) | 0.671 |  |  |  |  |
| **Full-time job** | **6918 (84.4%)** | **1712 (80.4%)** | **<0.001** | **0.798 (0.699-0.912)** | **<0.001** | 1770 (82.6%) | 543 (80.4%) | 0.213 |  |  |  |  |  |  |
| Night work | 496 (6.1%) | 152 (7.1%) | 0.065 | 1.063 (0.863-1.310) | 0.565 | 272 (12.7%) | 87 (12.9%) | 0.891 |  |  |  |  |  |  |
| **Night shift** | **2514 (31.0%)** | **532 (25.2%)** | **<0.001** | **0.848 (0.752-0.957)** | **0.007** | 802 (38.1%) | 218 (32.7%) | 0.011 | 0.896 (0.730-1.099) | 0.292 |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Modifiable factors** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Planned schedules | 7313 (89.2%) | 1888 (88.7%) | 0.471 |  |  | 1933 (90.2%) | 615 (91.1%) | 0.464 |  |  |  |  |  |  |
| Constant schedules | 4324 (52.8%) | 1111 (52.2%) | 0.637 |  |  | 953 (44.4%) | 313 (46.4%) | 0.382 |  |  |  |  |  |  |
| Job content questionnaire dimensions |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Speed and quantity | 8.64 (2.04) | 8.80 (2.10) | 0.001 | 0.996 (0.964-1.029) | 0.798 | 8.52 (2.06) | 8.77 (2.12) | 0.005 | 1.039 (0.977-1.104) | 0.221 |  |  |  |  |
| Complexity and intensity | 8.95 (1.66) | 9.12 (1.72) | <0.001 | 1.019 (0.978-1.061) | 0.364 | 9.09 (1.64) | 9.30 (1.62) | 0.005 | 0.996 (0.923-1.075) | 0.920 |  |  |  |  |
| **Fragmentation and unpredictability** | **8.76 (2.05)** | **8.86 (2.07)** | **0.055** | **0.959 (0.930-0.989)** | **0.008** | 8.73 (1.99) | 8.96 (1.97) | 0.007 | 0.993 (0.938-1.032) | 0.814 |  |  |  |  |
| Decision-making skills | 36.80 (6.86) | 35.14 (7.43) | <0.001 | 0.992 (0.983-1.001) | 0.068 | 35.62 (6.72) | 34.95 (7.13) | 0.032 | 1.010 (0.994-1.026) | 0.215 |  |  |  |  |
| **Use of skills** | **17.19 (2.98)** | **16.47 (3.15)** | **<0.001** | **0.952 (0.933-0.971)** | **<0.001** | **16.95 (2.76)** | **16.49 (2.71)** | **<0.001** | **0.957 (0.921-0.993)** | **0.021** |  |  |  |  |
| Skill development | 19.45 (3.11) | 18.91 (3.34) | <0.001 | 1.003 (0.984-1.023) | 0.722 | 19.31 (3.03) | 18.99 (3.09) | <0.001 | 1.004 (0.968-1.041) | 0.847 |  |  |  |  |
| Professional support from superiors | 5.31 (1.71) | 4.91 (1.79) | <0.001 | 0.922 (0.847-1.002) | 0.056 | 5.18 (1.71) | 4.85 (1.78) | <0.001 | 0.995 (0.850-1.164) | 0.948 |  |  |  |  |
| Professional support from colleagues | 6.38 (1.15) | 6.21 (1.26) | <0.001 | 1.053 (0.988-1.123) | 0.114 | **6.48 (1.10)** | **6.33 (1.20)** | **0.002** | **1.129 (1.001-1.274)** | **0.049** |  |  |  |  |
| Emotional support from superiors | 5.32 (1.77) | 4.94 (1.87) | <0.001 | 1.033 (0.954-1.119) | 0.421 | 5.20 (1.79) | 4.87 (1.87) | <0.001 | 0.981 (0.845-1.139) | 0.801 |  |  |  |  |
| **Emotional support from colleagues** | **6.33 (1.23)** | **6.10 (1.40)** | **<0.001** | **0.928 (0.875-0.984)** | **0.013** | **6.40 (1.16)** | **6.13 (1.40)** | **<0.001** | **0.836 (0.750-0.931)** | **0.001** |  |  |  |  |
| Fear of medical error | 2116 (25.8%) | 557 (26.2%) | 0.746 |  |  | 673 (31.4%) | 219 (32.4%) | 0.607 |  |  |  |  |  |  |
| **Emotional exhaustion** | **2164 (26.4%)** | **840 (39.5%)** | **<0.001** | **1.322 (1.161-1.506)** | **<0.001** | **506 (23.6%)** | **255 (37.8%)** | **<0.001** | **1.304 (1.034-1.645)** | **0.025** |  |  |  |  |
| Depersonalization | 1819 (22.2%) | 534 (25.1%) | 0.005 | 0.914 (0.802-1.042) | 0.179 | 513 (23.9%) | 164 (24.3%) | 0.845 |  |  |  |  |  |  |
| Lack of personal accomplishment | 2757 (33.6%) | 807 (37.9%) | <0.001 | 0.837 (0.837-1.049) | 0.259 | 721 (33.6%) | 251 (37.2%) | 0.090 | 0.934 (0.761-1.147) | 0.516 |  |  |  |  |
| Professional violence at the workplace |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Sustained bullying at the workplace** | **3034 (37.0%)** | **1075 (50.5%)** | **<0.0001** | **1.352 (1.213-1.507)** | **<0.001** | **824 (38.4%)** | **347 (51.4%)** | **<0.001** | **1.297 (1.065-1.579)** | **0.010** |  |  |  |  |
| Sexual harassment exposure | 585 (7.1%) | 171 (8.0%) | 0.158 | 1.936 (0.772-1.134) | 0.497 | 155 (7.2%) | 65 (9.6%) | 0.043 | 1.067 (0.767-1.484) | 0.699 |  |  |  |  |
| Sexual orientation-based discrimination | 501 (6.1%) | 153 (7.2%) | 0.070 | 1.129 (0.923-1.380) | 0.239 | 125 (5.8%) | 51 (7.6%) | 0.106 | 1.134 (0.788-1.631) | 0.498 |  |  |  |  |

Significant associations (p<0.05) are in bold.

\* Adjusted for all variables associated with major depression with p<0.2 in univariate analyses.

Figure 1. Geographical distribution of the participants.



Supplementary Annex 1. Recruitment process.

*Recruitment and sampling method.* The participants were contacted through public and private facilities and professional associations by professional mailings and through social networks. All professional associations were contacted by email, and all regional health agencies and territory hospital groups (*Groupements Hospitaliers de Territoire* [GHT] including regional networks of academic and nonacademic public hospitals) were contacted by phone to increase participation rates.

The following institutions/facilities actively participated in the dissemination of the study:

-Regional health agencies: Provence Alpes Côte d'Azur, Brittany, and Ile de France;

-Territory hospital groups including academic and nonacademic public hospitals: Alps, Dauphiné, Rhône centre, South Drôme, Ardèche, Western Brittany, South Brittany, Upper Brittany, South Corsica, South Val d'Oise, North Hauts-de-Seine, Ile de France, South Vaucluse, Var, Alpes-de-Haute-Provence, Bouches-du-Rhône, Alpes Maritimes, and Southern Alps;

-Academic hospitals: Assistance Publique Hôpitaux de Marseille, Assistance Publique Hôpitaux de Paris, Hospices Civils de Lyon, CHU d 'Amiens, CHU d 'Angers, CHU de Besancon, CHU de Brest, CHRU de Caen, CHU de Clermont-Ferrand, CHU de Dijon, CHU de Grenoble, CHU of Lille, CHU of Limoges, CHU of Martinique, CHU of Montpellier, CHRU of Nancy, CHU of Nantes, CHU of Pointe-à-Pitre/Les Abymes, CHU of Reims, CHU of Rennes, CHU of La Reunion, CHU of Rouen, CHU of Saint-Étienne, CHU of Toulouse, and CHRU of Tours;

-Private hospitals: Institut de Cancérologie de l'Ouest, Institut Bergonié, Centre François Baclesse, Centre Jean Perrin, Centre George-François Leclerc; Centre Oscar Lambret; Centre Léon Bérard; Institut Paoli-Calmettes; Centre Antoine Lacassagne, and Centre d’Oncologie et de Radio Thérapie 37 (CORT37);

-Associations: Conseils départementaux de l’Ordre des médecins (Charente-Maritime, Cote-d’Or, Cote d’Armor, Gironde, Deux-Sèvres, Essonnes, Guadeloupe, Guyana, Haute-Saône, Hérault and Loiret), French National Association of Occupational Therapists, National Association of Graduate Nurses and Students, French Association of Dieticians Nutritionists, French Association of Care Managers, Professional Association of Midwives, Committee of Agreement of the Nursing Training and Executives, National College of Physiotherapy, Fédération Hospitalière de France, Fédération Nationale des Associations d'Aides-soignants, Syndicat National des Infirmiers Anesthésistes, and Syndicat National des Infirmiers de Bloc Opératoire.

Finally, the survey was disseminated through social networks at two timepoints (at the beginning and one month later) to ensure the maximum representativeness of the sample.