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ORIGINAL ARTICLE

The insomnia, fatigue, and psychological well-being of hospital nurses 18 months after the COVID-19 pandemic began: A cross-sectional study

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Abstract

Background: Research has shown sleep problems, elevated fatigue, and high cases of burnout, as well as signs of post-traumatic stress and psychological distress among nurses during the COVID-19 pandemic. Many US hospitals attempted to minimise its impact on staff by providing basic resources, mental health services, and wellness programs. Therefore, it is critical to re-evaluate these well-being indices and guide future administrative efforts.

Purpose: To determine the long-term impact of the COVID-19 pandemic after 18 months on hospital nurses' insomnia, fatigue, burnout, post-traumatic stress, and psychological distress.

Design: Cross-sectional.

Methods: Data were collected online mainly through state board and nursing association listservs between July–September 2021 ($N = 2488$). The survey had psychometrically tested instruments (Insomnia Severity Index, Occupational Fatigue Exhaustion Recovery Scale, Maslach Burnout Inventory, Short Post-Traumatic Stress Disorder, and Patient Health Questionnaire-4) and sections on demographics, health, and work. The STrengthening the Reporting of Observational studies in Epidemiology checklist was followed for reporting.

Results: Nurses had subthreshold insomnia, moderate-to-high chronic fatigue, high acute fatigue, and low-to-moderate intershift recovery. Regarding burnout, they experienced increased emotional exhaustion and personal accomplishment, and some depersonalisation. Nurses had mild psychological distress but scored high on post-traumatic stress. Nurses who frequently cared for patients with COVID-19 in the past months scored significantly worse in all measures than their co-workers. Factors such as nursing experience, shift length, and frequency of rest breaks were significantly related to all well-being indices.

Conclusion: Nurses' experiences were similar to findings from the early pandemic but with minor improvements in psychological distress. Nurses who frequently provided

COVID-19 patient care, worked ≥12 h per shift, and skipped rest breaks scored worse on almost all well-being indices.

Relevance to clinical practice: Administration can help nurses' recovery by providing psychological support, mental health services, and treatment options for insomnia, as well as re-structure current work schedules and ensure that rest breaks are taken.

KEYWORDS
burnout, COVID-19 patients, distress, fatigue, insomnia, nurses, well-being

Hospital nurses often report problems with sleep, elevated fatigue, feelings of burnout, and symptoms of psychological distress (Bazazan et al., 2018; Knupp et al., 2018; Jun et al., 2021). These health problems are mainly due to heavy workloads, long working hours, and sub-optimal shift schedules (Dall'Ora et al., 2020; Knupp et al., 2018), and are linked to negative outcomes for hospitalised patients, nurses, and healthcare organisations (Cho & Steege, 2021; Dall'Ora et al., 2020; Jun et al., 2021). Nurses are also at high risk of developing post-traumatic stress symptoms because they are frequently exposed to traumatic situations directly and/or indirectly while providing patient care (Schuster & Dwyer, 2020). The repeated exposure to the coronavirus disease-19 (COVID-19) pandemic for nearly 2 years has worsened the aforementioned problems along with the working conditions of US hospital nurses (Melnyk et al., 2022; Mensinger et al., 2022; Sagherian et al., 2020; Shechter et al., 2020; Trinkoff et al., 2021). After the acute "fight response" phase of the COVID-19 pandemic, many hospitals in the country have worked to support nursing staff with different initiatives such as basic needs resources, wellness rooms dedicated for breaks and calming activities, resilience training, hospital rounds by wellness team members, and quick access to mental health services among others (Cho et al., 2021; NYC Health + Hospitals, 2021). However, the effectiveness of these interventions and resources for addressing the sustained impact of the pandemic is not known. Further, a survey of US hospital nurses' perceptions of organisational support revealed that staff perceived resources were decreasing as the pandemic continued, resources did not benefit all staff equally, and many did not have access to mental health resources, which are likely critical to improving and maintaining nurse well-being (Cho et al., 2021). Therefore, it is critical to evaluate the long-term impact of the ongoing COVID-19 pandemic on nurses' well-being particularly related to insomnia, fatigue, burnout, psychological distress, and post-traumatic stress, and guide future administrative efforts and available resources in areas of nurse need.

What does this paper contribute to the wider global clinical community?

- This paper reports on insomnia, elevated fatigue and burnout, and psychological problems of US hospital nurses 18 months after the COVID-19 pandemic began. Nurses' experiences overall were similar to reports from earlier in the pandemic.
- Nurses who primarily cared for hospitalised patients for non-COVID-19 reasons, were more experienced, worked traditional 8-h shifts, and regularly took 30-min rest breaks scored much better on almost all nurse-reported outcomes.
- The long-term impact of the COVID-19 pandemic is severe. Hospitals can facilitate nurses' recovery and provide access to mental health and insomnia treatment services, introduce changes to current work schedules, and ensure nurses are able to take their breaks.

1 | BACKGROUND

Since the beginning of the COVID-19 pandemic, demands for nursing staff increased dramatically in critical care areas (e.g., intensive care unit and COVID-19 designated unit) where the daily bed occupancy rate in US hospitals was anywhere between 80%–100% (Teriakidis et al., 2021). From mid-September–early December 2020, it was estimated the number of nurses caring for patients with COVID-19 increased from 22,500 to 77,500 per day (Teriakidis et al., 2021). Hospital nurses worked longer shifts (e.g., 12 h extending to 14 or 16 h) and extra days to care for high acuity patients and cover staffing shortages and sickness absences (Galanis et al., 2021; Turale et al., 2020). They also faced shortages in personal protective equipment and ventilators, worked in isolation units, had limited rest breaks, had to quickly learn about new COVID-19 protocols, and lived in fear of contracting the virus and spreading to others (Galanis et al., 2021; Sagherian et al., 2021; Turale et al., 2020).

Poor recovery during non-work hours, difficult working conditions, and the COVID-19 pandemic itself gravely influenced the overall health and psychological well-being of US hospital nurses (Melnyk et al., 2022; Mensinger et al., 2022; Sagherian et al., 2020; Shechter et al., 2020). Published data of nursing staff that represented the period between April 2020–early January 2021 show worrisome results. Similar to international studies (Al Maqbali et al., 2021; Galanis et al., 2021; Sun et al., 2021), many nurses developed symptoms of insomnia and psychological distress, experienced high levels of acute fatigue and burnout, and had

indications for high PTSD illness severity. For example, the prevalence of moderate–severe insomnia was 32.4%–45.4% (Mensinger et al., 2022; Sagherian et al., 2020), anxiety was 33.0%–62.3%, and depression was 29.5%–54.6% (Melnyk et al., 2022; Mensinger et al., 2022; Sagherian et al., 2020; Shechter et al., 2020). Nurses who were in the frontline caring for patients with COVID-19 showed worse outcomes in these aforementioned psychological and sleep areas than their co-workers who cared for patients for other health reasons (Gordon et al., 2021; Li et al., 2021; Sagherian et al., 2020), which is also in line with the international nursing literature.

Many hospitals acted upon these findings and started providing flexible scheduling, childcare support, resiliency training, easy access to mental health services, and wellness programs around sleep and psychological well-being among others (Cho et al., 2021; NYC Health + Hospitals et al., 2021). These initiatives and provided resources were aimed to minimise the adverse impact of the pandemic on nursing staff, improve well-being, and prevent any intentions to exit the workplace. However, the pandemic is ongoing and accompanied by multiple peaks in COVID-19 cases and subsequent hospitalisations, staffing shortages in certain parts of the country, and high workloads.

Little is known about the long-term impact of the pandemic on hospital nurses' psychological well-being, including the period (i.e., after March 2021) when vaccines became available for much of the US population. It is important to assess well-being indicators among hospital nurses and identify progress and needs for support particularly when the published data were largely collected from April 2020–early January 2021 only (Melnyk et al., 2022; Mensinger et al., 2022; Sagherian et al., 2020; Shechter et al., 2020). Therefore, the purpose of this cross-sectional study was to evaluate the levels of insomnia, fatigue, burnout, post-traumatic stress, and psychological distress in hospital nurses who remain at the bedside almost 18 months after the start of the pandemic.

The research questions were as follows: After 18 months of the pandemic

1. What is the current status and prevalence of insomnia reported by hospital nurses?
2. What are the current levels of acute and chronic fatigue experienced by hospital nurses?
3. What are the current levels of emotional exhaustion, depersonalisation, and personal accomplishment indicating burnout in hospital nurses?
4. What is the current situation of psychological well-being and the prevalence of psychological distress and post-traumatic stress in hospital nurses?

2 | METHODS

This study used the STrengthening the Reporting of Observational studies in Epidemiology checklist for cross-sectional studies (File S1).

2.1 | Design and sample

The study used an observational cross-sectional design. The adopted sampling approach was nonprobability convenience sampling. The target population was hospital nurses who provided bedside care in the United States. Registered nurses were recruited online from state board and nursing association listservs (9 listservs) and social media postings. The inclusion criteria were registered nurses who worked in the hospital and provided direct patient care in any nursing unit. The exclusion criteria were hospital nurses who were on vacation, maternity leave, medical leave, and paid/unpaid leave. Also, nurses who served in formal leadership and advanced practice roles, and in outpatient and non-hospital settings were not part of this study. Data collection took place between July 21–September 12, 2021.

The recommended conservative sample size was 1000 hospital nurses. This number was determined based on the number of employed registered nurses (population size 1,890,000) in hospitals reported by the US Bureau of Labor Statistics (Bureau of Labor Statistics, 2021), 3% margin of error, and 95% confidence interval (CheckMarket, n.d.). A similar sample size was determined based on the proportion of nurses' insomnia, psychological distress, and post-traumatic stress found in our previous study (Sagherian et al., 2020) with a 3% margin of error and 95% confidence interval.

The anonymous survey link in Qualtrics ^{XM} software (Qualtrics, Provo, UT) received 3987 clicks. After initial screening, 825 potential participants were found ineligible and excluded, and another 429 did not participate in the survey after meeting the eligibility criteria. The sample at this stage was 2733. Upon further examination, we excluded 23 participants because they were on paid/unpaid leave and another five participants who later reported to work outside the hospital setting. Finally, we excluded 217 participants that had no responses on any of the survey instruments. There were no significant differences between the respondents and nonrespondents based on sociodemographic characteristics (e.g., sex, age, ethnicity, race, education, marital status, and dependents). The final analytic sample was 2488, and was well-powered to explore any relationships with a small effect size.

2.2 | Ethical considerations

The study was determined as exempt and approved by the institutional review board committee of the relevant university. The first page of the online survey included all the elements of informed consent, information about thank you gift cards, and the contact information of the research team. The survey was anonymous and no personal identifiable information was collected. Participants who clicked "Yes" and consented and completed the survey were presented with the option to enter into a voluntary drawing. For the drawing, participants were asked to provide their email addresses on a separate page that could not be linked to any of the

survey responses. A total of 30 participants received $50 Amazon gift cards.

2.3 | Measures

The "Sleep And FatiguE during COVID-19 in health cARE workers 2" (SAFE-CARE II) survey consisted of multiple instruments related to nurses' overall well-being, nurse and patient-related outcomes, and organisational and personal resources. This study focused on the instruments that measured the concepts of insomnia, occupational fatigue, intershift recovery, burnout, post-traumatic stress, and psychological distress to better understand nurses' overall well-being. The survey also collected data on work and COVID-19 patient care, personal health, and demographic characteristics.

2.3.1 | Insomnia

The Insomnia Severity Index (ISI) included three items and measured the severity of difficulty falling asleep, difficulty maintaining asleep, and early morning awakenings. The ISI also included four items around sleep satisfaction and if sleep problems caused worry or distress, interfered with daily functioning, and were noticeable to other people (Morin et al., 2011). Item responses are on a 5-point Likert-type scale with a recall period over the past month. The sum of the item responses can range from 0–28 with higher scores indicating more of the construct. ISI scores can be interpreted as no insomnia (0–7), sub-threshold (8–14), moderate (15–21), and severe (22–28) forms of insomnia. The ISI had demonstrated robust psychometric properties: internal consistency, concurrent validity, and factor structure in general and clinical populations (Morin et al., 2011). The Cronbach's alpha was 0.86 in a prior study of U.S. hospital nursing staff (Sagherian et al., 2020) and 0.87 in our sample indicating good internal consistency.

2.3.2 | Occupational fatigue and intershift recovery

The Occupational Fatigue and Exhaustion Recovery (OFER-15) measured chronic and acute fatigue and intershift recovery (Winwood et al., 2005, 2006). The scale consisted of 15 items and three subscales (5 items in each). Item responses are on a 7-point Likert type scale from strongly disagree (0) to strongly agree (6). Total scores can range from 0–100 where higher values indicate higher fatigue and better intershift recovery. The scores can be interpreted as low (0–25), low-moderate (26–50), moderate-high (51–75), and high (76–100). The OFER-15 has good psychometrics properties: internal consistency, test–retest reliability, construct, discriminant, and factorial validity in the healthcare workforce including hospital nurses. The Cronbach's alphas for the subscales were ≥0.83 in hospital nursing staff (Sagherian et al., 2020) and ≥0.86 in our sample indicating good internal consistency.

2.3.3 | Burnout

The Maslach Burnout Inventory-Human Services Survey (MBI-HSS) measured the multidimensional concepts of burnout (Maslach & Jackson, 1981). The scale consisted of 22 items and three subscales measuring emotional exhaustion (EE), depersonalisation (DP), and personal accomplishment (PA). Item responses are on a 7-point Likert type scale from never (0) to every day (6). Responses in each subscale are summed and higher scores indicate higher EE, DP, and PA. Since its development in 1981 (Maslach & Jackson, 1981), the MBI-HSS has a long history of reliability and validity testing in human services workers (Maslach et al., 2016; Schaufeli et al., 1996) and in nurses from the United States and Europe (Kanste et al., 2006; Loera et al., 2014; Poghosyan et al., 2009). The Cronbach's alphas for the MBI subscales were ≥0.78 in hospital nursing staff (Sagherian et al., 2020). The Cronbach's alphas ranged from 0.78–0.93 in our sample indicating acceptable to excellent internal consistency.

2.3.4 | Post-traumatic stress

The Short Post-Traumatic Stress Disorder Rating Interview (SPRINT) measured post-traumatic stress disorder (PTSD) illness severity. It consisted of eight items that addressed core symptoms of PTSD (intrusion, avoidance, numbing, and arousal), somatic malaise, stress vulnerability, and the role and social dysfunction. Item responses are on a 5-point rating scale from not at all (0) to very much (4). A total score of ≥14 is considered high on PTSD symptom severity, a positive indication for PTSD and requires further clinical evaluation. The SPRINT has shown diagnostic accuracy of 96% for PTSD based on a cutoff score ≥14 in individuals with sustained trauma (Conner & Davidson, 2001; Davidson & Colket, 1997). It has good psychometric properties: good test–retest reliability, internal consistency, convergent, and divergent validity (Conner & Davidson, 2001). The Cronbach's alpha was 0.89 in hospital nursing staff (Sagherian et al., 2020) and 0.91 in our sample indicating excellent internal consistency.

2.3.5 | Psychological distress

The Patient Health Questionnaire-4 (PHQ-4) is a brief screening tool that measured psychological distress. It has two items for depression and two items for anxiety and responses are on a 4-point Likert type scale from not at all (0) to nearly every day (3). The responses for depression and anxiety items can be summed separately (≥3 suggest depression or anxiety) or as a total score ranging from 0–12. Total scores are interpreted as normal (0–2), mild (3–5), moderate (6–8), and severe (9–12) forms of psychological distress. The reliability, different types of validity, and factorial structure of the PHQ-4 have been demonstrated in general and clinical populations (Kroenke et al., 2009; Löwe et al., 2010). The Cronbach's alpha was 0.87 in hospital nursing staff (Sagherian et al., 2020) and 0.88 in our sample indicating good internal consistency.

2.3.6 | Work and COVID-19 patient care variables

The work variables addressed nurses' work status, work schedules, patient care and work-related practices, and the hospital setting. They were the following: years of experience (≤2, 3–8, 9–14, and ≥15 years), employment status (employed full time or part-time/per diem), having a second job (yes or no), working as a travel nurse (yes and no), shift types, usual shift length (8–10 and extended 12+ work hours), average worked hours per week from all jobs in the past month (≤40 h and >40 h), and unit of practice. Two questions asked nurses about providing direct patient care for patients with COVID-19 during their last shift (yes and no) and over the past few months (never, very rarely, rarely, occasionally, very frequently, and always). Nurses were also asked about the likelihood of taking rest breaks (30-min meal or coffee breaks) during work shifts (always-often, sometimes, and rarely never). Three questions were asked about the size (≤100, 101–250, and ≥251), type (Magnet, preparing for Magnet, not a Magnet, and I do not know), and location (urban, suburban, and rural) of the hospitals' nurses worked at during the time of the study.

2.3.7 | Personal health and demographic characteristics

Participants rated their subjective health status as follows: poor-fair, good, and very good-excellent. Average sleep hours during work days were categorised as follows: ≥7 h and <7 h that indicated short sleep duration (CDC, 2017). The demographic variables were as follows: age (≤30, 31–40, 41–50, and ≥51 years), sex (male and female), ethnicity (not Hispanic or Spanish origin and Hispanic or Spanish origin), race (White, Asian, Black, and others), marital status (not married and married/living with a partner), education level (associate or diploma, bachelor's degree, and masters or doctoral degree), student status (yes and no), dependents-children (yes and no), dependents-elderly (yes and no), and census region (Northeast, Midwest, South, and West).

2.4 | Data analysis

The data management followed by the statistical analysis was conducted in STATA 15.1 software. The variables were screened for errors and if any were treated as missing. The continuous variables (age, health, and scale scores) were examined for normality based on histograms and skewness and kurtosis tests. The histograms showed normal distributions with some asymmetry for acute fatigue (negative skewness). All skewness values were below the ±1.5 acceptable range for a large sample size (Kim, 2013). Kurtosis values were ≤3 except for acute fatigue which was 4.67. The boxplots identified outliers and *z*-scores were used to examine them closely. Few outliers on acute fatigue had *z*-scores >±3 *SD* (the cutoff point) and were not removed since they did not affect the mean value. The descriptive statistics included means (*M*) and standard deviations (*SD*) for the continuous variables, and frequencies (*n*) and percentages (%) for the categorical variables. The average missingness of the variables was 2.06% (range: 0.04–12.06) (File S2). Because our study was descriptive in nature, an item mean substitution technique was used to handle the missing data of an item on a scale. Therefore, the missing observation of a single item (cutoff point: missing 1 item or <20%) was imputed by the item mean of the remaining non-missing observations. No other missing data handling techniques were used.

Inferential statistics including independent sample *t*-tests and one-way analysis of variance (ANOVA) were used to examine group differences in mean scores for insomnia, occupational fatigue, intershift recovery, post-traumatic stress, and psychological distress based on the frequency of providing care to patients with COVID-19, and nurses' personal and work-related characteristics. Bonferroni's multiple-comparison test was used to test the pairwise difference in mean scores when ANOVA models were significant. This conservative approach reduces the risk of Type I error because of multiple comparisons. The parametric assumptions for homogeneity of variances using Levene's *t*-test (independent sample *t*-tests) and Bartlett's test for equal variances (ANOVA) were checked and met. In the few instances where homogeneity of variances was violated, we used the option of an independent sample *t*-test with unequal variances and reported Satterthwaite's approximation of the degrees of freedom. Similarly, when Bartlett's test for equal variances was significant, we generated robust standard errors and reported the adjusted *F*-statistics for the ANOVA model. Non-parametric chi-square test of independence was used to examine proportional differences between the categorical variables. Significance was set at a 0.05 level. All the scales were evaluated for internal consistency reliability by Cronbach's alphas, and values ≥0.70 were considered acceptable.

3 | RESULTS

Table 1 presents the demographic and health characteristics of the sample. Hospital nurses were mostly female (*n* = 2231, 89.71%), white (*n* = 1933, 78.13%), married or living with a partner (*n* = 1623, 65.39%) with a mean age of 41.50 (*SD* = 12.32, range = 20–76) years. On average, they reported to have good health (*M* = 3.14, *SD* = 0.87), and only 18.89% (*n* = 467) slept 7-h or more during work days. The sample consisted of hospital nurses mainly from Midwest (*n* = 848, 34.12%), South (*n* = 818, 32.92%), and West (*n* = 693, 27.89%) regions. Table 2 presents the work characteristics of the sample. Hospital nurses had a median of 10 years of nursing experience and worked ≤40 h per week (*n* = 1749, 70.64%) on extended 12+ h shifts (*n* = 2173, 87.34%) in urban (*n* = 1164, 47.07%) and Magnet (*n* = 1068, 42.98%) hospitals. Forty percent (*n* = 992) of the hospital nurses cared for patients with COVID-19 during their last worked shift. Also, 29.61% (*n* = 736) and 31.74% (*n* = 789) of the sample reported "occasionally" and "very frequently always" caring for patients with COVID-19 over the past few months, respectively.

TABLE 1 Demographic and personal health characteristics of the sample ($N = 2488$)

Study variables	Total *N* (%)
Age in years[a]	
≤30	592 (23.90)
31–40	690 (27.86)
41–50	549 (22.16)
≥51	646 (26.08)
Sex[a]	
Male	256 (10.29)
Female	2231 (89.71)
Ethnicity[a]	
Not Hispanic or Spanish origin	2329 (93.80)
Hispanic or Spanish origin	154 (6.20)
Race[a]	
White	1933 (78.13)
Asian	252 (10.19)
Black	119 (4.81)
Others	170 (6.87)
Education level	
Associate or diploma	596 (23.95)
Bachelor's degree	1623 (65.23)
Master's or doctoral degree	269 (10.81)
Currently a student	
Yes	374 (15.03)
No	2114 (84.97)
Marital status[a]	
Married or with partner	1623 (65.39)
Not married	859 (34.61)
Children as dependents[a]	
Yes	1095 (44.03)
No	1392 (55.97)
Elderly as dependents[a]	
Yes	280 (11.26)
No	2207 (88.74)
Subjective health status	
Poor-fair	586 (23.55)
Good	1079 (43.37)
Very good-excellent	823 (33.08)
Sleep during work days[a]	
<7 h	2005 (81.11)
≥7 h	467 (18.89)
Census regions[a]	
Northeast	126 (5.07)
Midwest	848 (34.12)
South	818 (32.92)
West	693 (27.89)

[a]Study variables had few missing observations. The category "not married" under marital status included being single ($n = 548$), widowed ($n = 32$), separated ($n = 34$), and divorced ($n = 245$). The "others" category under race included American Indian/Alaskan Native ($n = 28$), Native Hawaiian/other Pacific Islander ($n = 26$), Hispanics ($n = 81$), and more than one race ($n = 35$).

Around 41% ($n = 1009$) of the sample reported never-rarely taking 30-min breaks during work hours.

Table 3 presents a summary of the nurses' well-being outcomes. The sample indicated to have sub-threshold insomnia based on the mean ISI score of 13.41 ($SD = 5.53$). For descriptive purposes, 34.65% ($n = 862$) and 7.52% ($n = 187$) of the sample had moderate and severe forms of insomnia, respectively. Nurses on average had moderate-to-high chronic fatigue ($M = 67.40$, $SD = 24.04$), high acute fatigue ($M = 78.99$, $SD = 18.04$), and low-to-moderate intershift recovery ($M = 31.76$, $SD = 20.77$). Related to burnout, they experienced increased emotional exhaustion ($M = 34.93$, $SD = 12.93$) accompanied by increased personal accomplishment ($M = 33.15$, $SD = 7.71$) and only some feelings of depersonalisation ($M = 11.73$, $SD = 7.56$). Nurses on average scored high on PTSD illness severity ($M = 14.60$, $SD = 7.42$). Based on the SPRINT cut-off score of ≥14, 53.84% ($n = 1178$) of the sample scored positive for PTSD that calls for further clinical evaluation. Finally, nurses on average experienced mild psychological distress ($M = 5.35$, $SD = 3.36$). For descriptive purposes 19.03% ($n = 450$) of the sample had severe (PHQ-4 ≥ 9) form of psychological distress, 39.3% had depressive symptoms, and 53.2% had anxiety symptoms.

Also, Table 3 presents group differences in nurse well-being outcomes based on the frequency of caring for patients with COVID-19 over the past few months. There were significant differences between nurses who frequently always and nurses who never-rarely cared for patients with COVID-19 in the past few months based on all nurse-reported well-being outcomes. For example, nurses who frequently always cared for patients with COVID-19 scored significantly higher on insomnia [t (2484) = −5.077, $p < .001$] and lower on intershift recovery [t (1869.25) = 6.593, $p < .001$] than their coworkers who never-rarely cared for patients with COVID-19 over the past few months. Nurses who frequently always cared for patients with COVID-19 had high PTSD illness severity only ($M = 15.67$, $SD = 7.34$), t (2185) = −8.655, $p < .001$. Related to burnout indicators, the mean scores despite statistically significant differences indicated that nurses in both groups had only some feelings of depersonalisation and a high sense of personal accomplishment.

Tables 4 and 5 present the differences in nurse-reported well-being outcomes based on seven work-related variables (work experience, work status, having a second job, average worked hours per week, shift length, shift type, and 30-min breaks). Being a travel nurse had no significant impact on the nurse outcomes ($p_s > .05$) except for insomnia, therefore the data were not reported. Travel nurses had significantly higher insomnia scores ($M = 14.57$, $SD = 6.03$) than the non-travel nurses ($M = 13.31$, $SD = 5.47$),

TABLE 2 Work-related characteristics of the sample ($N = 2488$)

Years of experience[a]	
≤2	326 (13.11)
3–8	815 (32.77)
9–14	452 (18.17)
≥15	894 (35.95)
Work status	
Full time	2105 (84.61)
Part time or per diem	383 (15.39)
Second job[a]	
Yes	458 (18.42)
No	2029 (81.58)
Currently travel nurse	
Yes	200 (8.04)
No	2288 (91.96)
Unit of practice[a]	
Emergency department	268 (10.78)
Medical surgical	656 (26.39)
Intensive care/step down	860 (34.59)
OBGYN/labour-delivery	298 (11.99)
Specialty units	262 (10.54)
Float	66 (2.65)
One day services/procedures	76 (3.06)
Shift length	
Extended shifts (12+ h)	2173 (87.34)
Traditional shifts (8–10 h)	289 (11.62)
Others[b] (mixed or varies)	26 (1.05)
Shift type	
Day	1275 (51.25)
Evening	44 (1.77)
Night	856 (34.41)
Rotating and varies	313 (12.58)
Average work hours per week[a]	
≤40 h	1749 (70.64)
>40 h	727 (29.36)
Likelihood of 30-min breaks[a]	
Never or rarely	1009 (40.57)
Sometimes	878 (35.30)
Often or always	600 (24.13)
Hospital size[a]	
≤100 beds	504 (20.27)
101–250 beds	710 (28.56)
≥251 beds	1272 (51.17)
Hospital type[a]	
Magnet hospital	1068 (42.98)
On the journey towards Magnet	209 (8.41)
Not a Magnet hospital	907 (36.50)
I do not know	301 (12.11)
Hospital area[a]	
Rural	521 (21.07)
Suburban	788 (31.86)
Urban	1164 (47.07)

[a]Study variables had few missing observations.

[b]There were 17 shift types with different start points than routine 12-h shift schedules like 3 am–3 pm, 3 pm–3 am, 12 pm–12 am, 11 am–11 pm, and 1 pm–1 am among others.

(*t*(2486) = −3.0837, $p = .002$). As well, there were significant differences in insomnia scores for all the seven work-related variables ($p_s < .05$). For example, post hoc comparisons showed that nurses with ≥15 years of nursing experience had significantly lower insomnia scores than nurses with ≤2 years and 3–8 years of nursing experience. Post hoc comparisons showed that nurses who never/rarely took 30-min breaks had significantly higher insomnia scores than nurses who took 30-min breaks sometimes or often/always. There were also significant differences between nurses who took 30-min breaks sometimes and often/always.

In Table 4, for acute fatigue, there were significant differences in work experience ($p < .001$), having a second job ($p = .010$), shift length ($p < .001$), and 30-min breaks ($p < .001$). For example, post hoc comparisons showed significant differences in acute fatigue between nurses with ≤2 years and ≥15 years of nursing experience, and 3–8 years and ≥15 years of nursing experience. For chronic fatigue, there were significant differences in shift length, having a second job, and 30-min breaks ($p_s \leq .001$). For intershift recovery, there were significant differences in work experience ($p < .001$), work status ($p < .001$), having a second job ($p = .004$), shift length ($p < .001$), shift type ($p < .001$), and 30-min breaks ($p < .001$). For example, post hoc comparisons showed nurses on day shifts had significantly better intershift recovery than nurses on night shifts. The mean difference in intershift recovery scores between night and rotating nurses was not statistically significant ($p = .070$). All three measures were significantly related to 30-min breaks ($p < .001$). Post hoc comparisons showed nurses who never/rarely took 30-min breaks had significantly higher acute and chronic fatigue and lower intershift recovery than nurses who took 30-min breaks sometimes or often/always. Moreover, nurses who took sometimes 30-min breaks had significantly higher acute and chronic fatigue and lower intershift recovery than nurses who took 30-min breaks often/always.

In Table 5, for burnout indicators, emotional exhaustion was related to nurses' work experience ($p < .001$), having a second job ($p = .004$), shift length ($p = .005$), and 30-min breaks ($p < .001$). Feelings of depersonalisation were related to nurses' work experience, work status, shift length, and 30-min breaks ($p_s < .001$). Sense of personal accomplishment was related to nurses' work experience ($p < .001$), worked hours per week ($p < .001$), shift length ($p = .026$), shift type ($p < .001$), and 30-min breaks ($p < .001$). For example, post hoc comparisons showed day nurses had a significantly higher sense of personal accomplishment when compared to night or rotating nurses. All three measures were significantly related to 30-min

TABLE 3 Summary of insomnia, fatigue, burnout, and psychological well-being of the sample

Characteristics	Total *N*	*M* (*SD*)	Direct care for patients with COVID-19			
			Never-rarely (*n* = 961) *M* (*SD*)	Frequent-always (*n* = 1525) *M* (*SD*)	*t*	*p*
ISI						
Insomnia	2486	13.41 (5.53)	12.71 (5.38)	13.86 (5.58)	−5.08	<.001
OFER-15						
Chronic fatigue	2413	67.40 (24.04)	63.08 (25.56)	70.18 (22.58)	−6.95	<.001
Acute fatigue	2412	78.99 (18.04)	76.04 (19.82)	80.88 (16.55)	−6.23	<.001
Intershift recovery	2412	31.76 (20.77)	35.29 (21.59)	29.52 (19.92)	6.59	<.001
MBI-HSS						
Emotional exhaustion	2263	34.93 (12.93)	32.46 (13.48)	36.50 (12.33)	−7.17	<.001
Depersonalisation	2264	11.73 (7.56)	10.24 (7.09)	12.67 (7.70)	−7.69	<.001
Personal accomplishment	2262	33.15 (7.71)	33.62 (7.87)	32.86 (7.59)	2.29	.022
SPRINT						
Post-traumatic stress	2188	14.60 (7.42)	12.89 (7.22)	15.67 (7.34)	−8.66	<.001
PHQ-4						
Psychological distress	2370	5.35 (3.36)	4.82 (3.26)	5.68 (3.39)	−6.05	<.001

Note: The grouping variable "direct care for patients with COVID-19" were collapsed into two categories as follows: never-rarely (never, very rarely, and rarely) vs. frequent-always (occasionally, very frequently, and always).

Abbreviations: COVID-19, Coronavirus 2019; ISI, Insomnia Severity Index; M, Mean; MBI-HSS, Maslach Burnout Inventory; OFER, Occupational Fatigue Exhaustion Recovery; PHQ-4, Patient-Health Questionnaire-4; SD, Standard Deviation; SPRINT, Short Post-Traumatic Stress Disorder Rating Interview; *t*, value for Independent Samples t-test.

breaks ($p < .001$). Post hoc comparisons showed nurses who never/rarely took 30-min breaks had significantly higher emotional exhaustion and feelings of depersonalisation than nurses who took 30-min breaks sometimes or often/always. Nurses who never/rarely took 30-min breaks had a significantly lower sense of personal accomplishment compared only to nurses who took 30-min breaks often/always. Moreover, nurses who took 30-min breaks sometimes had significantly higher emotional exhaustion and feelings of depersonalisation and a lower sense of personal accomplishment than nurses who took 30-min breaks often/always.

As shown in Table 5, psychological distress and post-traumatic stress were related to nurses' work experience ($p < .001$), work status ($p < .001$), shift length ($p < .05$), and 30-min breaks ($p < .001$). For example, post hoc comparisons showed nurses who never/rarely take 30-min breaks had scored significantly higher on psychological distress (PHQ-4 indicates moderate level) and post-traumatic stress (SPRINT indicates high PTSD symptom severity) compared with nurses who took 30-min breaks sometimes or often/always. There were also significant differences in psychological distress and post-traumatic stress scores between nurses who took 30-min breaks sometimes and often/always. Moreover, post-traumatic stress was significantly related to worked hours per week ($p = .026$).

As for hospital characteristics (bed size, type, and location), there were few significant relationships with the nurse-reported well-being outcomes. Therefore, the detailed data were not presented in the tables. The relationship between hospital bed size and depersonalisation was significant: $F(2, 2259) = 3.94$, $p = .020$. Post hoc comparisons only showed nurses from larger (≥251 beds) hospitals had significantly higher feelings of depersonalisation ($M = 11.97$, $SD = 7.47$) when compared to nurses from smaller (≤100 beds) hospitals ($M = 10.85$, $SD = 7.67$, $p = .021$). The relationship between hospital location and personal accomplishment was significant: $F(2, 2246) = 3.47$, $p = .031$. Specifically, nurses working in urban hospitals had a significantly lower sense of personal accomplishment ($M = 32.79$, $SD = 7.84$) when compared to nurses working in rural hospitals ($M = 33.92$, $SD = 7.34$, $p = .025$). Finally, the relationship between hospital type and chronic fatigue was significant: $F(3, 2406) = 5.44$, $p = .001$. Post hoc comparisons only showed that nurses working in Magnet hospitals ($M = 65.27$, $SD = 24.79$) were less chronically fatigued than nurses working in non-Magnet hospitals ($M = 69.65$, SD = 23.28, $p < .001$). However, both of these mean scores indicate chronic fatigue at a moderate-to-high level.

4 | DISCUSSION

Our findings provide evidence on the levels of insomnia, fatigue, and psychological well-being among hospital nurses almost 18 months into the pandemic. On average, the sample had subthreshold clinical insomnia, moderate-to-high chronic fatigue, high acute fatigue, and low-to-moderate intershift recovery. Hospital nurses experienced emotional exhaustion and some feelings of depersonalisation, as well as increased personal accomplishment. They had a mild form of psychological distress but scored high on PTSD symptom severity.

TABLE 4 Differences in nurse-reported outcomes (insomnia, fatigue types, and intershift recovery) by work-related characteristics

	ISI	OFER		
	Insomnia	AF	CF	IR
Work experience				
≤2	14.00 (5.42)	80.47 (17.87)	66.71 (25.40)	28.83 (20.85)
3–8	13.91 (5.74)	80.53 (16.23)	68.99 (23.49)	28.93 (18.68)
9–14	13.50 (5.60)	79.36 (18.16)	67.91 (23.74)	31.21 (20.22)
≥15	12.69 (5.25)	76.84 (19.37)	65.93 (24.09)	35.72 (22.14)
F (*p*)	8.66 (<.001)	6.59 (<.001)	2.39 (.067)	17.19 (<.001)
Work status				
Part time	12.44 (5.19)	78.38 (17.60)	65.80 (23.19)	36.21 (22.32)
Full time	13.59 (5.57)	79.10 (18.13)	67.69 (24.18)	30.95 (20.38)
t (*p*)	−3.76 (<.001)	−0.70 (.481)	−1.40 (.161)	4.23 (<.001)
Work per week				
≤40 h.	13.26 (5.54)	78.56 (17.86)	67.24 (23.87)	32.27 (20.93)
>40 h.	13.78 (5.49)	79.95 (18.39)	67.64 (24.49)	30.57 (20.30)
t (*p*)	−2.10 (.036)	−1.72 (.085)	−0.37 (.711)	1.82 (.069)
Second job				
Yes	12.87 (5.36)	76.86 (19.56)	63.90 (24.95)	34.42 (20.71)
No	13.53 (5.56)	79.47 (17.66)	68.21 (23.76)	31.14 (20.74)
t (*p*)	−2.30 (.022)	−2.57 (.010)	−3.41 (<.001)	2.99 (.003)
Shift length				
Extended	13.54 (5.53)	80.02 (17.06)	68.12 (23.64)	30.61 (20.17)
Traditional	12.47 (5.44)	71.90 (22.72)	62.72 (25.80)	40.29 (23.01)
t (*p*)	3.10 (.002)	5.76 (<.001)	3.32 (.001)	−6.69 (<.001)
Shift type				
Day	12.47 (5.42)	79.72 (18.15)	67.83 (24.10)	32.90 (21.25)
Night	14.82 (5.45)	78.47 (17.49)	67.50 (24.06)	29.44 (20.00)
Rotating	13.20 (5.33)	78.37 (18.35)	65.55 (23.80)	32.63 (19.86)
F (*p*)	48.26 (<.001)	1.51 (.221)	1.07 (.344)	7.39 (<.001)
30-min breaks				
Never/rarely	14.51 (5.43)	82.85 (15.83)	73.92 (21.07)	27.38 (18.80)
Sometimes	13.22 (5.42)	79.02 (16.91)	66.75 (22.77)	31.92 (20.16)
Often/always	11.85 (5.45)	72.58 (21.01)	57.56 (26.80)	38.77 (22.72)
F (*p*)	45.98 (<.001)	53.87 (<.001)	83.90 (<.001)	53.46 (<.001)

Note: t = value of *t* statistics for Independent Samples t-test, *F* = value of *F* statistics for an ANOVA model.

Abbreviations: AF, Acute Fatigue; CF, Chronic Fatigue; IR, Intershift Recovery; ISI, Insomnia Severity Index; OFER, Occupational Fatigue and Exhaustion Recovery Scale.

These findings with the exception of psychological distress which improved from moderate to mild level were similar to our SAFE-CARE I study where data were collected early in the COVID-19 pandemic (Sagherian et al., 2020).

4.1 | Insomnia and related risks

Multiple US studies during the COVID-19 pandemic have shown insomnia is related to psychological health problems and poor physical health in healthcare staff (Diaz et al., 2022; Kandemir et al., 2022). Our sample had subthreshold clinical insomnia with a mean ISI score of 13.41 (see Table 3) higher than the 10.60 in the general US population during the first wave of the pandemic (Morin et al., 2021). The prevalence of moderate–severe insomnia was 42.2% which was similar to previous reports among hospital nurses (Mensinger et al., 2022; Sagherian et al., 2020) but almost double the pre-COVID-19 23.2% estimated in the US workforce (Kessler et al., 2011). In our study, 81.1% of the sample had slept less than 7 h on work days (i.e., short sleep), and those who worked nights, 12 or

TABLE 5 Differences in nurse-reported outcomes (burnout dimensions, psychological distress, and post-traumatic stress) by work-related characteristics

	MBI-HSS			PHQ-4	SPRINT
	EE	DP	PA	Psych. distress	PTSD
Work experience					
≤2	34.95 (13.01)	12.80 (7.51)	32.74 (7.43)	5.89 (3.23)	15.28 (7.52)
3–8	37.14 (11.73)	13.55 (7.13)	32.09 (7.55)	5.80 (3.39)	15.72 (7.57)
914	34.99 (12.84)	12.31 (7.71)	32.78 (7.80)	5.24 (3.28)	14.29 (7.14)
≥15	32.88 (13.63)	9.42 (7.30)	34.45 (7.73)	4.79 (3.32)	13.51 (7.21)
F (*p*)	14.73 (<.001)	45.07 (<.001)	13.34 (<.001)	15.64 (<.001)	12.48 (<.001)
Work status					
Part time	34.04 (12.98)	10.49 (7.38)	33.25 (7.61)	4.81 (3.08)	13.28 (7.02)
Full time	35.09 (12.92)	11.96 (7.57)	33.14 (7.72)	5.45 (3.40)	14.84 (7.47)
t (*p*)	−1.41 (.159)	−3.36 (<.001)	0.25 (.806)	−3.58 (<.001)	−3.61 (<.001)
Work per week					
≤40 h.	34.82 (12.99)	11.80 (7.53)	32.70 (7.63)	5.28 (3.30)	14.37 (7.36)
>40 h.	35.09 (12.83)	11.56 (7.65)	34.30 (7.79)	5.49 (3.48)	15.14 (7.57)
t (*p*)	−0.45 (.652)	0.69 (.492)	−4.50 (<.001)	−1.41 (.156)	−2.22 (.026)
Second job					
Yes	33.25 (13.25)	11.69 (7.62)	33.82 (8.14)	5.14 (3.31)	14.26 (7.59)
No	35.30 (12.84)	11.74 (7.55)	33.02 (7.59)	5.39 (3.37)	14.66 (7.38)
t (*p*)	−2.89 (.004)	−0.12 (.909)	1.91 (.056)	−1.44 (.151)	−0.96 (.335)
Shift length					
Extended	35.30 (12.71)	11.96 (7.57)	32.99 (7.71)	5.40 (3.36)	14.77 (7.44)
Traditional	32.71 (14.00)	10.27 (7.31)	34.13 (7.69)	4.93 (3.26)	13.44 (7.09)
t (*p*)	2.82 (.005)	3.39 (<.001)	−2.23 (.026)	2.20 (.028)	2.66 (.008)
Shift type					
Day	35.35 (12.93)	11.50 (7.66)	33.74 (7.53)	5.36 (3.40)	14.42 (7.55)
Night	34.81 (12.91)	12.10 (7.51)	32.51 (7.83)	5.42 (3.38)	15.10 (7.27)
Rotating	33.77 (12.82)	11.88 (7.23)	32.50 (7.84)	5.15 (3.15)	14.11 (7.31)
F (*p*)	1.75 (.174)	1.51 (.221)	7.08 (<.001)	0.69 (.503)	2.64 (.071)
30-min rest breaks					
Never/rarely	38.25 (11.51)	12.78 (7.51)	32.51 (7.90)	6.17 (3.38)	16.13 (7.35)
Sometimes	34.72 (12.54)	11.48 (7.62)	33.03 (7.60)	5.13 (3.33)	14.61 (7.32)
Often/always	29.88 (13.92)	10.39 (7.32)	34.36 (7.41)	4.31 (3.04)	12.10 (6.99)
F (*p*)	73.76 (<.001)	18.44 (<.001)	10.35 (<.001)	63.53 (<.001)	52.23 (<.001)

Note: *t* = value of *t* statistics for independent samples *t*-test, F = value of *F* statistics for an ANOVA model.

Abbreviations: DP, Depersonalisation; EE, Emotional Exhaustion; MBI-HSS, Maslach Burnout Inventory-Human Services Survey; PA, Personal Accomplishment; PHQ-4, Patient Health Questionnaire-4; PTSD, Post-Traumatic Stress Disorder; SPRINT, Short Post-Traumatic Stress Disorder Rating Interview.

more hours per shift, and more than 40 h per week had significantly higher insomnia scores than their co-workers (see Table 4). A recent longitudinal study by Abdalla et al. (2021) found the prevalence of moderate–severe insomnia symptoms improved significantly over 10 weeks, and that healthcare staff who were much younger, had worked additional hours, and in a COVID-19 environment were more likely to develop moderate–severe insomnia symptoms (Abdalla et al., 2021). Contrary, the prevalence of moderate–severe insomnia remained high in hospital nurses almost 18 months later. Our nurses were unlikely to gain some normalcy in their sleep habits whether related to scheduling, the COVID-19 work environment, or personal reasons. It is more likely that nurses' acute insomnia from the early pandemic has changed to chronic insomnia. Nurses are urged to seek clinical evaluation from a healthcare provider (preferably a sleep

specialist) and discuss the option of cognitive behavioural therapy which is the first line of effective therapy to treat chronic insomnia (Trauer et al., 2015).

4.2 | Occupational fatigue and related risks

During the pandemic, hospital nurses on average had high acute fatigue and low-moderate intershift recovery attributed to ongoing high workloads, understaffing issues, and extended shifts that limited their opportunity to adequately sleep after work hours. Nurses who were on the frontline with COVID-19 patient care had slightly higher acute fatigue and lower intershift recovery scores than the group who never-rarely cared for patients with COVID-19 (see Table 3). Compared to the early COVID-19 pandemic (Sagherian et al., 2020), the mean scores on the OFER-15 for acute fatigue and intershift recovery remained the same while chronic fatigue scores increased by 11.61% (2020: 60.39 ± 24.06 vs. 2021: 67.40 ± 24.04). The level of chronic fatigue was moderate-high and much worse among frontline nurses with COVID-19 patient care (see Table 3). There are two major concerns with these fatigue findings. First, high acute fatigue carries immediate safety and performance concerns that are related to poor outcomes for patients (e.g., poor communication, errors) and hospital nurses (e.g., absenteeism) (Sagherian, Clinton, et al., 2017; Sagherian, Unick, et al., 2017; Schroers et al., 2021). Workers develop acute fatigue as a normal response to work demands and exert effort to accomplish them (Winwood et al., 2005). Yet, it is the very high acute fatigue not relieved by frequent rest breaks at work and adequate sleep and restful activities after work hours (Sagherian et al., 2021; Winwood et al., 2007) that creates workplace problems. Second, with partial fatigue recovery over prolonged periods, acute fatigue accumulates and shifts to chronic fatigue (Winwood et al., 2005). This type of fatigue can be considered a maladaptive recovery condition that is not relieved by simple rest and sleep anymore, and is strongly related to psychological problems such as depression, anxiety, and burnout (Ruggiero, 2003; Rose et al., 2017; Sikaras et al., 2022;). Therefore, fatigue mitigation strategies need to account for the effects of the pandemic, and address both fatigue types rather than acute fatigue alone.

4.3 | Burnout and related risks

Burnout is another area of concern that is common among hospital nurses. Galanis et al. (2021) conducted a meta-analysis based on six studies published early in the pandemic and showed the pooled prevalence of emotional exhaustion was 34.1%, depersonalisation was 12.6% and lack of personal accomplishment was 15.2% (Galanis et al., 2021). Based on the MBI, hospital nurses experienced high burnout in the domain of emotional exhaustion accompanied by an increased sense of personal accomplishment and some feelings of depersonalisation (see Table 3). Our findings are conceptually similar to Galanis et al.'s (2021) prevalence rates despite the different scoring approach and almost identical to our earlier COVID-19 study (Sagherian et al., 2020). We also found that nurses who worked longer shifts, routinely skipped rest breaks, and frequently cared for patients with COVID-19 had significantly higher scores of emotional exhaustion than their co-workers. These work-related risk factors along with others like increased workload, lack of materials and human resources, and longer worktimes in isolation units have been related to burnout in previous COVID-19 studies (Galanis et al., 2021; Melnyk et al., 2022; Sagherian et al., 2020). It is possible to lower burnout by interrupting the long-term exposure to stressors in the workplace that emotionally drain nurses. While some nurses may choose to leave the institution, one practical approach for emotionally exhausted nurses who were on the frontline is to be transferred from COVID-19 isolation units to open floors. Other areas to target simultaneously are nurses' work schedules (e.g., limiting additional work days and longer shifts), heavy workloads and rest breaks, as well as wellness support and the promotion of stress management programs to treat burnout in the workplace (Dall'Ora et al., 2020; Galanis et al., 2021; Janeway, 2020; Melnyk et al., 2022; Sagherian et al., 2020).

4.4 | Psychological distress, post-traumatic stress, and related risks

Hospital nurses had some improvement in psychological distress when compared to our study early in the pandemic (Sagherian et al., 2020). Nurses caring for patients with COVID-19 or for other health reasons were found to have on an average mild form of psychological distress (see Table 3). Additionally, the prevalence of probable cases of depression and anxiety decreased to 39.3% and 53.2% respectively. Longitudinal studies from United Kingdom and Norway have shown decelerations in the trajectories of depression and anxiety among the general population 4–5 months into the COVID-19 pandemic (Ebrahimi et al., 2022; Fancourt et al., 2021). In these studies, factors such as easing strict lockdown/social distancing protocols, exercise, and less reliance on maladaptive coping strategies have shown to improve one or both outcomes. Possibly, our nurses after 18 months into the pandemic coped better with COVID-19 challenges (e.g., fear, isolation, and uncertainty), gained more knowledge about COVID-19 pathogenesis and management protocols, and had access to personal protective equipment among others. Nurses may have used the mental health services, self-help tool kits, distress helplines, or the well-being initiatives provided by hospitals, nursing associations, and national agencies to better manage their depression, anxiety, and the negative effects of the ongoing pandemic (ANA Enterprise, 2022; CDC, 2021; NYC Health + Hospitals, 2021).

As for PTSD symptom severity, the total sample and nurses who frequently always cared for patients with COVID-19 scored high. Alarmingly, one in two nurses scored positive for PTSD cases based on the SPRINT's cut-off score of ≥14, which was similar to what was reported in our previous study (Sagherian et al., 2020). This threshold has shown a diagnostic accuracy of 96.0% among people with one

or more traumatic events (Conner & Davidson, 2001) which calls for nurses to seek further clinical evaluation. Shechter et al.'s (2021) longitudinal study over 10 weeks in healthcare staff found the prevalence of PTSD symptoms (Primary Care-PTSD questionnaire) to be 55.2% at baseline which dropped over time to 25.0%. Also, nurses and those working in COVID-19 designated locations were more likely to develop PTSD symptoms at the end of the study (Shechter et al., 2021). Possibly, nurses who were frequently engaged in the care of high acuity patients with COVID-19 during their 12-h shifts had repeatedly encountered traumatic psychologically draining events (e.g., suffering of patients alone, rapid deteriorations, and traumatic intubations) that increased the severity of PTSD-associated symptoms and the risk for PTSD. As shown in Table 5, nurses who were younger, working full-time, longer shifts, more than 40 h per week, and skipping rest breaks had significantly higher PTSD illness severity scores. Detailed clinical assessment is critical for our frontline nurses followed by early referrals for PTSD management like cognitive processing therapy (Cooper et al., 2020; Moring et al., 2020) where the long-term effects of PTSD are detrimental to health (Ryder et al., 2018). In line with previous findings around the beneficial role of rest breaks on well-being (De Wijn & van der Doef, 2020; Sagherian et al., 2021; Wendsche et al., 2016), nurses can start the process of interrupting the prolonged exposure to patients with COVID-19 and psychologically detach from work by regularly taking rest breaks during 12-h shifts that are often sacrificed.

5 | LIMITATIONS

Our study has several limitations. One limitation is related to convenience sampling which has low external validity. This type of sampling approach may yield a biased sample that does not represent nurses involved in direct patient care in the hospital setting. However, our study had a large sample size and used a recruitment approach that relied mainly on state board and nursing association listservs, which comprised 85.4% of the sample. To address concerns about external validity, we compared our analytic sample to key characteristics from the 2020 National Nursing Workforce Survey where 54.8% of their nurses reported working in hospitals (Smiley et al., 2021). The sample was similar based on sex, ethnicity, having a second job, and years of experience and somewhat different based on age, certain racial groups, and education. Specifically, we had a higher proportion of Asian and lower proportion of Black nurses, and participants who were more baccalaureate prepared. The median age of our sample was 40 years, which was younger than the reported national median age of 52 years (Smiley et al., 2021) but comparable to a large survey of 24,013 hospital nurses engaged in direct patient care (Ma & Stimpfel, 2018). Overall, these comparisons provide some degree of confidence in the representativeness of our findings to hospital nurses with certain demographic and work characteristics in the United States. Another limitation may be related to response bias. Hospital nurses who faced more psychological and sleep problems during the pandemic may be more motivated or contrary not interested to report their experiences. Related to measurement, the SPRINT—a self-reported PTSD screening tool—is not validated in hospital nurses against the gold standard of clinician-rated structured interviews, and therefore may result in more false positives. However, the SPRINT had an excellent internal consistency of ≥0.89 in our previous and current large nursing samples and showed a one-factor structure. Finally, the study's cross-sectional design limits the true evaluation of temporal changes in our interested outcomes after 18 months into the pandemic, however, the findings are still informative and depict the current status quo of US hospital nurses.

6 | CONCLUSION

Our data collected almost 18 months into the pandemic showed US nurses at the bedside and particularly those involved in COVID-19 patient care continued to suffer from insomnia, high occupational fatigue, and interrelated psychological problems. The next logical step for researchers is to partner with nursing leadership and initiate and evaluate pragmatic workplace interventions largely integrated during work hours for hospital nurses and those on COVID-19 designated units. For example, such an intervention may consist of optimal work scheduling arrangements and adjusting workloads by introducing a variety of staff mix, and use of rest breaks to practice wellness support activities. Other interventions for the treatment of insomnia and post-traumatic stress cases will depend on clinical evaluation and medical diagnosis.

7 | RELEVANCE TO CLINICAL PRACTICE

Our study can help nurses at the bedside and guide nursing management to make informed decisions in multiple areas. Collaborative efforts between nurses, nursing management, and hospital administration will help nurses remain at the bedside, as well as facilitate their recovery from the serious work-related and psychological problems exacerbated by the COVID-19 pandemic. For nursing management, one specific area to intervene is building a more stable work environment that will require hospital administrative support and allocated resources. Nurses remain extremely fatigued, are experiencing burn out, and continue to have suboptimal work schedules that consist of extra work days and shifts lasting more than 12 h per day, which indicates poorly staffed units with increased workloads. Therefore, it is important to adequately staff nursing units, adjust workloads while accounting for the aftermath of the pandemic, and institute better scheduling practices. The latter will also help nurses rest and sleep at least for 7 h as recommended and in contrast to published research using actigraphy and self-reported data that indicates nurses get 5.5–6.5 h of total sleep (Farag et al., 2021; Geiger-Brown et al., 2012; Sagherian et al., 2020). Another area to intervene is to transfer nurses from the frontline who were regularly involved in the care of patients with COVID-19 to other nursing care units. This step will interrupt the continuous exposure of nurses to patients with COVID-19 who are critically ill, their feelings of uncertainty

related to patient outcomes, and the routine of being away from co-workers and remaining in isolation units, all of which will emotionally drain and psychologically distress nurses. For nurses, rest breaks present an opportunity to detach from patient care responsibilities physically and mentally. With manageable workloads and adequately staffed units, nurses can take their much-needed rest breaks regularly to eat, drink, and practice some relaxation activities like deep breathing, listening to music, walking outside the hospital, or taking power naps. Finally, much of the attention and wellness resources addressed nurses' depression and anxiety. Nurses are encouraged to seek medical advice for their insomnia and symptoms of post-traumatic stress and in turn hospitals should facilitate quick access for nurses to their mental health and behavioural sleep medicine experts.

AUTHOR CONTRIBUTIONS

All authors have made substantial contributions to the manuscript to meet the criteria for authorship and have reviewed and agreed to the final version. KS, HC, and LS conceived the study and the design. HC and LS led data collection, and KS conducted the statistical analysis and interpretation of data. KS, HC, and LS contributed to the drafting of the manuscript and revising it for critically important intellectual content and approved the final version for submission.

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CONFLICT OF INTEREST

No conflict of interest has been declared by the authors.

DATA AVAILABILITY STATEMENT

Research data are not shared.

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REFERENCES

Abdalla, M., Chiuzan, C., Shang, Y., Ko, G., Diaz, F., Shaw, K., McMurry, C., Cannone, D. E., Sullivan, A. M., Lee, S. A., Venner, H., & Shechter, A. (2021). Factors associated with insomnia symptoms in a longitudinal study among new York City healthcare workers during the COVID-19 pandemic. *International Journal of Environmental Research and Public Health*, *18*(17), 8970. https://doi.org/10.3390/ijerph18178970

Al Maqbali, M., Al Sinani, M., & Al-Lenjawi, B. (2021). Prevalence of stress, depression, anxiety and sleep disturbance among nurses during the COVID-19 pandemic: A systematic review and meta-analysis. *Journal of Psychosomatic Research*, *141*, 110343. https://doi.org/10.1016/j.jpsychores.2020.110343

American Nurses Association Enterprise (2022). Well-Being Initiative. Retrieved from https://www.nursingworld.org/practice-policy/work-environment/health-safety/disaster-preparedness/coronavirus/what-you-need-to-know/the-well-being-initiative/

Bazazan, A., Dianat, I., Rastgoo, L., & Zandi, H. (2018). Relationships between dimensions of fatigue and psychological distress among public hospital nurses. *Health Promotion Perspectives*, *8*(3), 195–199. https://doi.org/10.3390/10.15171/hpp.2018.26

Bureau of Labor Statistics (2021). Registered Nurses. Retrieved from https://www.bls.gov/ooh/healthcare/registered-nurses.htm#tab-3

Centers for Disease Control and Prevention (2017). How Much Sleep Do I Need? Retrieved from https://www.cdc.gov/sleep/about_sleep/how_much_sleep.html

Centers for Disease Control and Prevention (2021). COVID-19 Information for the Workplace. Retrieved from https://www.cdc.gov/niosh/emres/2019_ncov_default.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fniosh%2Femres%2F2019_ncov.html

Cho, H., Sagherian, K., & Steege, L. M. (2021). Hospital nursing staff perceptions of resources provided by their organizations during the COVID-19 pandemic. *Workplace Health & Safety*, *69*(4), 174–181. https://doi.org/10.3390/10.1177/2165079920987543

Cho, H., & Steege, L. M. (2021). Nurse fatigue and nurse, patient safety, and organizational outcomes: A systematic review. *Western Journal of Nursing Research*, *43*(12), 1157–1168. https://doi.org/10.1177/0193945921990892

Conner, K. M., & Davidson, J. R. (2001). SPRINT: A brief global assessment of post-traumatic stress disorder. *International Clinical Psychopharmacology*, *16*(5), 279–284. https://doi.org/10.1097/00004850-200109000-00005

Cooper, J., Phelps, A. J., Ng, C. H., & Forbes, D. (2020). Diagnosis and treatment of post-traumatic stress disorder during the COVID-19 pandemic. *Australian Journal of General Practice*, *49*(12), 785–789. https://doi.org/10.31128/AJGP-07-20-5557

Dall'Ora, C., Ball, J., Reinius, M., & Griffiths, P. (2020). Burnout in nursing: A theoretical review. *Human Resources for Health*, *18*(1), 41. https://doi.org/10.1186/s12960-020-00469-9

Davidson, J. R., & Colket, J. T. (1997). The eight-item treatment-outcome post-traumatic stress disorder scale: A brief measure to assess treatment outcome in post-traumatic stress disorder. *International Clinical Psychopharmacology*, *12*(1), 41–45. https://doi.org/10.1097/00004850-199701000-00006

De Wijn, A. N., & van der Doef, M. P. (2020). Patient-related stressful situations and stress-related outcomes in emergency nurses: A cross-sectional study on the role of work factors and recovery during leisure time. *International Journal of Nursing Studies*, *107*, 103579. https://doi.org/10.1016/j.ijnurstu.2020.103579

Diaz, F., Cornelius, T., Bramley, S., Venner, H., Shaw, K., Dong, M., Pham, P., McMurry, C., Cannone, D. E., Sullivan, A. M., Lee, S. A. J., Schwartz, J. E., Shechter, A., & Abdalla, M. (2022). The association between sleep and psychological distress among new York City healthcare workers during the COVID-19 pandemic. *Journal of Affective Disorders*, *298*, 618–624. https://doi.org/10.1016/j.jad.2021.10.033

Ebrahimi, O. V., Hoffart, A., & Johnson, S. U. (2022). Mechanisms associated with the trajectory of depressive and anxiety symptoms: A linear mixed-effects model during the COVID-19 Pandemic. *Current Psychology*, 1–18. https://doi.org/10.1007/s12144-022-02732-9

Fancourt, D., Steptoe, A., & Bu, F. (2021). Trajectories of anxiety and depressive symptoms during enforced isolation due to COVID-19 in

England: A longitudinal observational study. *The Lancet Psychiatry*, *8*(2), 141–149. https://doi.org/10.1016/S2215-0366(20)30482-X

Farag, A., Moon, C., & Xiao, Q. (2021). Work and personal characteristics associated with sleep behavior among acute care nurses. *Journal of Nursing Regulation*, *12*(1), 40–51. https://doi.org/10.1016/S2155-8256(21)00019-3

Galanis, P., Vraka, I., Fragkou, D., Bilali, A., & Kaitelidou, D. (2021). Nurses' burnout and associated risk factors during the COVID-19 pandemic: A systematic review and meta-analysis. *Journal of Advanced Nursing*, *77*(8), 3286–3302. https://doi.org/10.1111/jan.14839

Geiger-Brown, J., Rogers, V. E., Trinkoff, A. M., Kane, R. L., Bausell, R. B., & Scharf, S. M. (2012). Sleep, sleepiness, fatigue, and performance of 12-hour-shift nurses. *Chronobiology International*, *29*(2), 211–219. https://doi.org/10.3109/07420528.2011.645752

Gordon, J. M., Magbee, T., & Yoder, L. H. (2021). The experiences of critical care nurses caring for patients with COVID-19 during the 2020 pandemic: A qualitative study. *Applied Nursing Research*, *59*, 151418. https://doi.org/10.1016/j.apnr.2021.151418

Janeway, D. (2020). The role of psychiatry in treating burnout among nurses during the Covid-19 pandemic. *Journal of Radiology Nursing*, *39*(3), 176–178. https://doi.org/10.1016/j.jradnu.2020.06.004

Jun, J., Ojemeni, M. M., Kalamani, R., Tong, J., & Crecelius, M. L. (2021). Relationship between nurse burnout, patient and organizational outcomes: Systematic review. *International Journal of Nursing Studies*, *119*, 103933. https://doi.org/10.1016/j.ijnurstu.2021.103933

Kandemir, D., Temiz, Z., Ozhanli, Y., Erdogan, H., & Kanbay, Y. (2022). Analysis of mental health symptoms and insomnia levels of intensive care nurses during the COVID-19 pandemic with a structural equation model. *Journal of Clinical Nursing*, *31*(5–6), 601–611. https://doi.org/10.1111/jocn.15918

Kanste, O., Miettunen, J., & Kyngäs, H. (2006). Factor structure of the Maslach burnout inventory among Finnish nursing staff. *Nursing & Health Sciences*, *8*(4), 201–207. https://doi.org/10.1111/j.1442-2018.2006.00283.x

Kessler, R. C., Berglund, P. A., Coulouvrat, C., Hajak, G., Roth, T., Shahly, V., Shillington, A. C., Stephenson, J. J., & Walsh, J. K. (2011). Insomnia and the performance of US workers: results from the America insomnia survey. *Sleep*, *34*(9), 1161–1171. https://doi.org/10.5665/SLEEP.1230

Kim, H. Y. (2013). Statistical notes for clinical researchers: Assessing normal distribution (2) using skewness and kurtosis. *Restorative Dentistry & Endodontics*, *38*(1), 52–54. https://doi.org/10.5395/rde.2013.38.1.52

Knupp, A. M., Patterson, E. S., Ford, J. L., Zurmehly, J., & Patrick, T. (2018). Associations among nurse fatigue, individual nurse factors, and aspects of the nursing practice environment. *JONA. The Journal of Nursing Administration*, *48*(12), 642–648. https://doi.org/10.1097/NNA.0000000000000693

Kroenke, K., Spitzer, R. L., Williams, J. B. W., & Löwe, B. (2009). An ultra-brief screening scale for anxiety and depression: The PHQ–4. *Psychosomatics*, *50*(6), 613–621. https://doi.org/10.1176/appi.psy.50.6.613

Li, J., Su, Q., Li, X., Peng, Y., & Liu, Y. (2021). COVID-19 negatively impacts on psychological and somatic status in frontline nurses. *Journal of Affective Disorders*, *294*, 279–285. https://doi.org/10.1016/j.jad.2021.07.031

Loera, B., Converso, D., & Viotti, S. (2014). Evaluating the psychometric properties of the Maslach Burnout Inventory-Human Services Survey (MBI-HSS) among Italian Nurses: How many factors must a researcher consider? *PLoS ONE*, *9*(12), e114987. https://doi.org/10.1371/journal.pone.0114987

Löwe, B., Wahl, I., Rose, M., Spitzer, C., Glaesmer, H., Wingenfeld, K., Schneider, A., & Brähler, E. (2010). A 4-item measure of depression and anxiety: Validation and standardization of the patient health Questionnaire-4 (PHQ-4) in the general population. *Journal of Affective Disorders*, *122*(1–2), 86–95. https://doi.org/10.1176/10.1016/j.jad.2009.06.019

Ma, C., & Stimpfel, A. W. (2018). The association between nurse shift patterns and nurse-nurse and nurse-physician collaboration in acute care hospital units. *JONA: The Journal of Nursing Administration*, *48*(6), 335–341. https://doi.org/10.1097/NNA.0000000000000624

Maslach, C., & Jackson, S. E. (1981). The measurement of experienced burnout. *Journal of Organizational Behavior*, *2*(2), 99–113. https://doi.org/10.1002/job.4030020205

Maslach, C., Jackson, S. E., & Leiter, M. P. (2016). *Maslach Burnout Inventory manual* (4th ed.). Mind Garden.

Melnyk, B. M., Hsieh, A. P., Tan, A., Teall, A. M., Weberg, D., Jun, J., Kate, G., & Hoying, J. (2022). Associations among nurses' mental/physical health, lifestyle behaviors, shift length, and workplace wellness support during COVID-19: Important implications for health care systems. *Nursing Administration Quarterly*, *46*(1), 5–18. https://doi.org/10.1097/NAQ.0000000000000499

Mensinger, J. L., Brom, H., Havens, D. S., Costello, A., D'Annunzio, C., Durning, J. D., Bradley, P. k., Copel, L., Maldonado, L., Smeltzer, S., Yost, J., & Kaufmann, P. (2022). Psychological responses of hospital-based nurses working during the COVID-19 pandemic in the United States: A cross-sectional study. *Applied Nursing Research*, *63*, 151517. https://doi.org/10.1016/j.apnr.2021.151517

Morin, C. M., Belleville, G., Bélanger, L., & Ivers, H. (2011). The insomnia severity index: Psychometric indicators to detect insomnia cases and evaluate treatment response. *Sleep*, *34*(5), 601–608.

Morin, C. M., Bjorvatn, B., Chung, F., Holzinger, B., Partinen, M., Penzel, T., Ivers, H., Wing, Y. K., Chan, N. Y., Merikanto, I., Mota-Rolim, S., Macêdo, T., De Gennaro, L., Léger, D., Dauvilliers, Y., Plazzi, G., Nadorff, M. R., Bolstad, C. J., Sieminski, M., … Espie, C. A. (2021). Insomnia, anxiety, and depression during the COVID-19 pandemic: An international collaborative study. *Sleep Medicine*, *87*, 38–45. https://doi.org/10.1016/j.sleep.2021.07.035

Moring, J. C., Dondanville, K. A., Fina, B. A., Hassija, C., Chard, K., Monson, C., Losavio, S. T., Wells, S. Y., Morland, L. A., Kaysen, D., Galovski, T. E., & Resick, P. A. (2020). Cognitive processing therapy for posttraumatic stress disorder via telehealth: Practical considerations during the COVID-19 pandemic. *Journal of Traumatic Stress*, *33*(4), 371–379. https://doi.org/10.1002/jts.22544

NYC Health + Hospitals (2021). Healthcare Association of New York State Recognizes NYC Health + Hospitals/Elmhurst for Employee Mental Health Support Services During Pandemic. Retrieved from https://www.nychealthandhospitals.org/pressrelease/hanys-recognizes-elmhurst-for-employee-support-services-during-pandemic/

Poghosyan, L., Aiken, L. H., & Sloane, D. M. (2009). Factor structure of the Maslach burnout inventory: An analysis of data from large scale cross-sectional surveys of nurses from eight countries. *International Journal of Nursing Studies*, *46*(7), 894–902. https://doi.org/10.1016/j.ijnurstu.2009.03.004

Rose, D. M., Seidler, A., Nübling, M., Latza, U., Brähler, E., Klein, E. M., Wiltink, J., Michal, M., Nickels, S., Wild, P. S., König, J., Claus, M., Letzel, S., & Beutel, M. E. (2017). Associations of fatigue to work-related stress, mental and physical health in an employed community sample. *BMC Psychiatry*, *17*(1), 167. https://doi.org/10.1186/s12888-017-1237-y

Ruggiero, J. S. (2003). Correlates of fatigue in critical care nurses. *Research in Nursing & Health*, *26*(6), 434–444. https://doi.org/10.1002/nur.10106

Ryder, A. L., Azcarate, P. M., & Cohen, B. E. (2018). PTSD and physical health. *Current Psychiatry Reports*, *20*(12), 116. https://doi.org/10.1007/s11920-018-0977-9

Sagherian, K., Clinton, M. E., Huijer Abu-Saad, H., & Geiger-Brown, J. (2017). Fatigue, work schedules and perceived performance in bedside care nurses. *Workplace Health and Safety*, *65*(7), 304–312. https://doi.org/10.1177/2165079916665398

Sagherian, K., McNeely, C. A., & Steege, L. M. (2021). Did rest breaks help with acute fatigue among nursing staff on 12-h shifts during the COVID-19 pandemic? A cross-sectional study. *Journal of Advanced Nursing*, *77*(12), 4711–4721. https://doi.org/10.1111/jan.14944

Sagherian, K., Steege, L. M., Cobb, S. J., & Cho, H. (2020). Insomnia, fatigue and psychosocial well-being during COVID-19 pandemic: A cross-sectional survey of hospital nursing staff in the United States. *Journal of Clinical Nursing*. https://doi.org/10.1111/jocn.15566

Sagherian, K., Unick, G. J., Zhu, S., Derickson, D., Hinds, P. S., & Geiger-Brown, J. (2017). Acute fatigue predicts sickness absence in the workplace: A 1-year retrospective cohort study in paediatric nurses. *Journal of Advanced Nursing*, *73*(12), 2933–2941. https://doi.org/10.1111/jan.13357

Schaufeli, W. B., Leiter, M. P., Maslach, C., & Jackson, S. E. (1996). The Maslach burnout inventory-general survey. In C. Maslach, S. E. Jackson, & M. P. Leiter (Eds.), *Maslach burnout inventory* (3rd ed., pp. 19–26). Consulting Psychologists Press.

Schroers, G., Ross, J. G., & Moriarty, H. (2021). Nurses' perceived causes of medication administration errors: A qualitative systematic review. *The Joint Commission Journal on Quality and Patient Safety*, *47*(1), 38–53. https://doi.org/10.1016/j.jcjq.2020.09.010

Schuster, M., & Dwyer, P. A. (2020). Post-traumatic stress disorder in nurses: An integrative review. *Journal of Clinical Nursing*, *29*(15–16), 2769–2787. https://doi.org/10.1111/jocn.15288

Shechter, A., Chiuzan, C., Shang, Y., Ko, G., Diaz, F., Venner, H. K., Shaw, K., Cannone, D. E., McMurry, C. L., Sullivan, A. M., Rivera, R. R., Vose, C., Shapiro, P. A., & Abdalla, M. (2021). Prevalence, incidence, and factors associated with posttraumatic stress at three-month follow-up among New York city healthcare workers after the first wave of the COVID-19 Pandemic. *International Journal of Environmental Research and Public Health*, *19*(1), 262. https://doi.org/10.3390/ijerph19010262

Shechter, A., Diaz, F., Moise, N., Anstey, D. E., Ye, S., Agarwal, S., Birk, J. L., Brodie, D., Cannone, D. E., Chang, B., Claassen, J., Cornelius, T., Derby, L., Dong, M., Givens, R. C., Hochman, B., Homma, S., Kronish, I. M., Lee, S. A., … Abdalla, M. (2020). Psychological distress, coping behaviors, and preferences for support among New York healthcare workers during the COVID-19 pandemic. *General Hospital Psychiatry*, *66*, 1–8. https://doi.org/10.1016/j.genhosppsych.2020.06.007

Sikaras, C., Ilias, I., Tselebis, A., Pachi, A., Zyga, S., Tsironi, M., Gil, A. P. R., & Panagiotou, A. (2022). Nursing staff fatigue and burnout during the COVID-19 pandemic in Greece. *AIMS Public Health*, *9*(1), 94–105. https://doi.org/10.3934/publichealth.2022008

Smiley, R. A., Ruttinger, C., Oliveira, C. M., Hudson, L. R., Allgeyer, R., Reneau, K. A., Silvestre, J. H., & Alexander, M. (2021). The 2020 national nursing workforce survey. *Journal of Nursing Regulation*, *12*(1), S1–S96. https://doi.org/10.1016/S2155-8256(21)00027-2

Sun, P., Wang, M., Song, T., Wu, Y., Luo, J., Chen, L., & Yan, L. (2021). The psychological impact of COVID-19 pandemic on health care workers: A systematic review and meta-analysis. *Frontiers in Psychology*, *12*, 626547. https://doi.org/10.3389/fpsyg.2021.626547

Teriakidis, A., McNitt, J., McAllister, M., Sizemore, O. (2021). *COVID-19 impact on nurse staffing and ICU beds*. EPIC RESEARCH. https://epicresearch.org/articles/covid-19-impact-on-nurse-staffing-and-icu-beds

Trauer, J. M., Qian, M. Y., Doyle, J. S., Rajaratnam, S. M., & Cunnington, D. (2015). Cognitive behavioral therapy for chronic insomnia: A systematic review and meta-analysis. *Annals of Internal Medicine*, *163*(3), 191–204. https://doi.org/10.7326/M14-2841

Trinkoff, A. M., Baldwin, C. M., Chasens, E. R., Dunbar-Jacob, J., Geiger-Brown, J., Imes, C. C., Landis, C. A., Patrician, P. A., Redeker, N. S., Rogers, A. E., Scott, L. D., Todero, C. M., Tucker, S. J., & Weinstein, S. M. (2021). CE: Nurses are more exhausted than ever: What should we do about it? *AJN The American Journal of Nursing*, *121*(12), 18–28. https://doi.org/10.1097/01.NAJ.0000802688.16426.8d

Turale, S., Meechamnan, C., & Kunaviktikul, W. (2020). Challenging times: Ethics, nursing and the COVID-19 pandemic. *International Nursing Review*, *67*(2), 164–167. https://doi.org/10.1111/inr.12598

Wendsche, J., Lohmann-Haislah, A., & Wegge, J. (2016). The impact of supplementary short rest breaks on task performance: A meta-analysis. *Sozialpolitik. ch*, *2*(2), 2–3. https://doi.org/10.1016/10.18753/2297-8224-75

Winwood, P. C., Bakker, A. B., & Winefield, A. H. (2007). An investigation of the role of non-work-time behavior in buffering the effects of work strain. *Journal of Occupational and Environmental Medicine*, *49*(8), 862–871. https://doi.org/10.1097/JOM.0b013e318124a8dc

Winwood, P. C., Lushington, K., & Winefield, A. H. (2006). Further development and validation of the occupational fatigue exhaustion recovery (OFER) scale. *Journal of Occupational and Environmental Medicine*, *48*(4), 381–389. https://doi.org/10.1097/01.jom.0000194164.14081.06

Winwood, P. C., Winefield, A. H., Dawson, D., & Lushington, K. (2005). Development and validation of a scale to measure work-related fatigue and recovery: The occupational fatigue exhaustion/recovery scale (OFER). *Journal of Occupational and Environmental Medicine*, *47*(6), 594–606. https://doi.org/10.1097/01.jom.0000161740.71049.c4

SUPPORTING INFORMATION

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

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