


## ORIGINAL ARTICLE

# Predictors of professional burnout and fulfilment in a longitudinal analysis on nurses and healthcare workers in the COVID-19 pandemic

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## Abstract

**Aims and objectives:** (1) To investigate the vulnerability of nurses to experiencing professional burnout and low fulfilment across 5 months of the COVID-19 pandemic. (2) To identify modifiable variables in hospital leadership and individual vulnerabilities that may mitigate these effects.

**Background:** Nurses were at increased risk for burnout and low fulfilment prior to the COVID-19 pandemic. Hospital leadership factors such as organisational structure and open communication and consideration of employee opinions are known to have positive impacts on work attitudes. Personal risk factors for burnout include symptoms of depression and anxiety.

**Methods:** Healthcare workers ( $n = 406$  at baseline,  $n = 234$  longitudinal), including doctors ( $n = 102$ ), nurses ( $n = 94$ ), technicians ( $n = 90$ ) and non-clinical administrative staff ( $n = 120$ ), completed 5 online questionnaires, once per month, for 5 months. Participants completed self-report questionnaires on professional fulfilment and burnout, perceptions of healthcare leadership, and symptoms of anxiety and depression. Participants were recruited from various healthcare settings in the southeastern United States. The STROBE checklist was used to report the present study.

**Results:** Both at baseline and across the 5 months, nurses working during the COVID-19 pandemic reported increased burnout and decreased fulfilment relative to doctors. For all participants, burnout remained largely steady and fulfilment decreased slightly. The strongest predictors of both burnout and fulfilment were organisational structure and depressive symptoms. Leadership consideration and anxiety symptoms had smaller, yet significant, relationships to burnout and fulfilment in longitudinal analyses.

**Conclusions:** Burnout and reduced fulfilment remain a problem for healthcare workers, especially nurses. Leadership styles and employee symptoms of depression and anxiety are appropriate targets for intervention.

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**Relevance to clinical practice:** Leadership wishing to reduce burnout and increase fulfilment among employees should increase levels of organisational support and consideration and expand supports to employees seeking treatment for depression and anxiety.

**KEYWORDS**

anxiety, burnout, depression, health personnel, hospital administration, leadership, nurses, patient health questionnaire, psychological

## 1 | INTRODUCTION

Burnout and poor mental health in American healthcare workers (HCW) is a pressing public health issue, and the COVID-19 pandemic has brought these under-addressed issues into immediate awareness. Burnout among medical staff is usually high (Shah et al., 2020; Shanafelt et al., 2015), but the pandemic has worsened it (Magnavita, Soave, & Antonelli, 2021a). With 1.2 million physicians, 2 million nurses in hospitals and another 1.2 million outside hospitals, and millions of other healthcare workers in a variety of specialties and settings affected by the ongoing stresses of the increased workload and emotional burden, monitoring and protecting the physical and mental well-being of all HCW is of utmost importance (Erich & McKenney, 2020).

## 2 | BACKGROUND

Burnout consists of emotional exhaustion, depersonalization or reduced feelings of accomplishment. Burnout can happen in any employment setting but is especially relevant in HCW because it leads to an increase in compassion fatigue, workplace turnover (Kelly et al., 2021), lower quality of care, decreased patient satisfaction (Anagnostopoulos et al., 2012; Dall'Ora et al., 2020) and increased rates of medical errors (Hall et al., 2016; Menon et al., 2020). In the ongoing fight against COVID-19, which has strained medical systems across the United States for over 2 years, any reduction in quality of care could have drastic consequences.

Meta-analytic results from before the COVID-19 pandemic indicate that as many as 54% of physicians (West et al., 2016) and 52% of nurses (Zhang et al., 2018) experienced burnout. Unsurprisingly, burnout has remained high during the COVID-19 pandemic (Denning et al., 2021; Galanis et al., 2021; O'Brien et al., 2021). Nurses are particularly important to study as they occupy a unique position in the healthcare system that increases their vulnerability. Nurses have been shown to have greater burnout and reduced job satisfaction relative to doctors in both the SARS epidemic (Tolomiczenko et al., 2005), COVID-19 pandemic (Barello et al., 2020). Some unique nursing factors that may lead to higher rates of burnout include higher risk of infection (Firew et al., 2020), increased concern that infection control measures are insufficient, feeling less informed and less involved in decision-making (Dall'Ora et al., 2020; Tolomiczenko

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

- All healthcare workers, especially nurses, remain vulnerable to burnout and low fulfilment during the COVID-19 pandemic with little change over time.
- Organisational structure and depression symptoms are the strongest predictors of work attitudes.
- Consideration of employee opinions and anxiety symptoms have a smaller though significant relationship to work attitudes.

et al., 2005), increased exposure to physically violent or verbally aggressive behaviours from patients (Crabbe et al., 2004; Pariona-Cabrera et al., 2020), and greater emotional labour in their work (Schmidt & Diestel, 2014).

While most studies focus on physicians and nurses, there are many other types of healthcare workers that often go overlooked, including technicians, custodians and non-clinical support staff. Few studies investigate the roles separately, and those that do have found that first-line medical workers do not always have higher psychological distress (Dobson et al., 2021; Jang et al., 2021). For instance, one investigation in Australia indicated that allied health professionals and other professionals had similar levels of burnout as junior medical staff, with senior medical staff having the lowest rate of burnout and nurses having the greatest (Dobson et al., 2021). Another in France, showed that nursing assistants were at particular risk for peritraumatic disassociation (Azoulay et al., 2020).

Both systemic and individual-level factors are associated with burnout, including organisational support and organisational justice, as well as personal mental health symptoms. Organisational support is defined by the level of resources, reinforcement, encouragement and communication provided to an individual by the institution they perform in (Rhoades & Eisenberger, 2002). Relatedly, organisational justice is defined by equality in procedural decisions, interpersonal consideration, and the distribution of resources and information (Enoksen, 2015). System-level factors such as sufficient personal protective equipment (PPE) (Savitsky et al., 2021), greater infection control procedures and a balanced workload are associated with greater job satisfaction

(Embriaco et al., 2007; Tolomiczenko et al., 2005). Lower levels of organisational justice when combined with greater workloads increase risk for HCW developing burnout as well as anxious and depressive symptoms (Magnavita, Soave, & Antonelli, 2021b). When considering nurses specifically, nurses who experience more organisational support report higher levels of work performance and job satisfaction (Labrague et al., 2018) and lower levels of stress and anxiety (Labrague & De Los Santos, 2020). Additionally, adequate communication and greater decision-making power could also have a positive influence on nurses' burnout, as many reported an association between these factors and burnout during the SARS epidemic (Tolomiczenko et al., 2005). During COVID-19, organisational variables such as lack of testing, lack of PPE, doubt that their institution would support them if they became infected, lack of childcare support, and fear of being moved to an unfamiliar ward or institution constituted the greatest sources of anxiety for nurses during the first year of the pandemic (Labrague & De Los Santos, 2020). The leadership style of non-physician supervisors is also related to burnout and satisfaction of employees (Dyrbye et al., 2020).

Individual factors such as personal mental health symptoms, including depression and anxiety, are also related to burnout among HCW (Denning et al., 2021). Depression and suicidality have been longstanding problems in the medical community, and discrimination in medical licensing and hospital privileges for physicians who seek mental health treatment have perpetuated the problem (Center et al., 2003). While multiple programs have been created to reduce the rates of depression and suicide among physicians and physicians in training, rollout to nurses has lagged behind (Davidson et al., 2008), potentially increasing disparities between these groups. Moreover, anxiety is one of the most common psychiatric conditions encountered in HCW, with young nurses being the most vulnerable (Tiete et al., 2020). Further, a study on Chinese HCW demonstrated a positive association between anxiety symptoms with burnout and emotional exhaustion (Ding et al., 2014). Occupational stresses further contribute to anxiety in HCW, contributing to a positive feedback loop (Ding et al., 2014).

It is clear that mental health symptoms among HCW have increased since the start of the pandemic, with a high proportion of all HCW reporting significant levels of trauma, anxiety and depression (Saragih et al., 2021). The high mortality and infection rates, as well as the lack of resources and guidelines experienced during this COVID-19 pandemic, contributed to a high risk of psychological impact on HCW, particularly among nurses (Carmassi et al., 2020). Data from seventeen countries demonstrate a higher prevalence of anxiety in HCW than in the general population during the COVID-19 pandemic (Labrague & De Los Santos, 2020). Nurses reported the highest levels of anxiety, with prevalence ranging from 15% to 92%, the main source of anxiety being a fear of unknowingly becoming infected or of infecting others (Luo et al., 2020). Indeed, HCW who had an unprotected exposure to a COVID-19 patient had a twofold risk of anxiety and

depression, while those who contracted COVID-19 had a fourfold risk (Magnavita et al., 2020).

Another component of workplace well-being is professional fulfilment, an element of job satisfaction which in many ways is the opposite of burnout. Professional fulfilment is defined as feeling meaningfulness, self-worth, self-efficacy and satisfaction at work (Jyothindran et al., 2020). Greater professional fulfilment is also associated with fewer medical errors (Jyothindran et al., 2020). Fulfilment and job satisfaction are positively correlated with intent to stay in a particular position (Gilles et al., 2014) and mitigate the effects of burnout (Burns et al., 2021; Gilles et al., 2014). A study focused on physicians found that autonomy, salary, patient and colleague relationships, and administrative support were positively associated with job satisfaction (Konrad et al., 1999). Similarly, a collegial environment was associated with greater fulfilment for physicians (Burns et al., 2021). These findings are like those focused on nurses, for whom autonomy, sense of accomplishment, administrative support and work challenge are associated with greater levels of fulfilment (Faris et al., 2010).

However, research on rates and predictors of professional fulfilment of HCW, especially American HCW, during the COVID-19 pandemic is sparse. One study of Belgian HCW found a low prevalence of fulfilment (Tiete et al., 2020), and two-thirds of a sample of Canadian anaesthesiologists expressed low levels of professional fulfilment (O'Brien et al., 2021). Another study on German HCW found that nurses working on COVID-19 wards had lower levels of fulfilment than their colleagues on other wards, a pattern that was not observed in physicians and may be attributable to the greater workload and direct contact with patients that nurses experience (Zerbini et al., 2020). Just as burnout rates increased with the increased stress and anxiety felt during the pandemic, the rates of fulfilment observed in these studies are likely to be lower than those that would have been measured beforehand. However, it is possible that low levels of fulfilment were an emerging issue before 2020.

The present study describes the state of both burnout and professional fulfilment in a sample of HCW in the United States during the winter 2020–2021 surge of the COVID-19 pandemic. We sought to expand on previous research by using a more diverse sample of HCW that included not only physicians and nurses but also health-care workers who often go underappreciated and are understudied: medical assistants and technicians, and non-clinical administrative and support staff. Additionally, we examined two universal and relatively easily modifiable elements of institutional/organisational support: consideration, the degree to which leadership elicits, responds to, and incorporates feedback from employees, and structure, the degree to which leadership clearly communicates expectations and coordinates teamwork (Fleishman & Harris, 1962). Finally, we also examined the impact of the two most commonly experienced psychological symptoms: anxiety and depression. These variables were examined both at baseline and longitudinally over five measurements at 1-month intervals. The longitudinal analyses allowed us to examine any changes in these relationships over time and to determine whether they were occupation-specific.

### 3 | METHODS

#### 3.1 | Procedures

All procedures were approved by the Internal Review Board at the University of Florida. The Strengthening and Reporting of Observational Studies in Epidemiology (STROBE) guideline (Vandenbroucke et al., 2007) for observational studies (Appendix S1) was used in reporting methods and findings. Analyses presented here focus on data provided by HCW that were collected from the first 5 months of an 8-month longitudinal study of the effects of the COVID-19 pandemic on HCW. There was significant attrition (<64% of baseline participants remained after the fifth month of data collection), so only data from the first 5 months are analysed here. Participants were mostly recruited from two academic medical centres in the State of Florida via announcements posted throughout hospitals and clinics and via brochures emailed to relevant departments or clinical services from a department head or an administrator. Additional flyers were distributed to private practices and smaller medical groups in the two cities surrounding the academic medical centres. Finally, the study was included as part of the Healthcare Worker Exposure Responses & Outcomes (HERO) registry of studies ([heroesresearch.org](http://heroesresearch.org)). To keep responses anonymous, the participants' exact location or place of employment was not attached to their responses. Eligibility criteria were broad and included anyone currently employed by a healthcare agency and had the ability to complete the online questionnaires in English. Participants either followed a link or scanned a QR code on the brochure that took them to a secure survey service, REDCap, where they recorded their responses to the survey questions. Participants were recruited on a rolling basis, with data for the first timepoint being collected between October and December 2020. Participants were sent follow-up surveys 1 month from their initial survey date and each subsequent month for a total of 5 months. Participants were provided with \$10 Amazon gift cards as an honorarium for their time at the baseline study, with payment for each subsequent timepoint escalating by \$5. At the outset, considering the expected attrition rate in a longitudinal design, we sought to collect around 400 participants in the first assessment to have a sufficiently large sample for the longitudinal analyses. Recruitment was ended in December of 2020 due to having recruited the minimum goal of 400 participants, to declining enrolment and desire to limit the confound of varying start date. While it was not a predictable part of the study design, it is important to note that COVID-19 vaccines became available to high-risk medical workers in these health systems in December of 2020 and were available to all HCW in January of 2020. Questions regarding vaccine status were added to the survey starting at timepoint 4. At that timepoint, 197 participants responded to the vaccine questions. The majority of participants had either received the vaccine (74.6%) or were planning to receive the vaccine when it became available to them (5.6%).

#### 3.2 | Measures

##### 3.2.1 | Fulfilment and burnout

The Professional Fulfilment Index (PFI; Trockel et al., 2018) is a 16-item self-report measure that was administered at each timepoint and used to capture two types of *work attitudes*: fulfilment and burnout. *Fulfilment* is defined as the degree of intrinsic positive reward the employee finds in their work and includes 6 items assessing happiness, meaningfulness, contribution, self-worth, satisfaction and feeling in control. *Burnout* is defined as the degree of exhaustion and disengagement the employee feels in their work and includes 10 items assessing sense of dread, physical and emotional exhaustion, and lack of enthusiasm, empathy, and connection with patients and colleagues. Each item is scored on a Likert scale from 0 (*not at all true*) to 4 (*completely true*). The PFI is evidenced to be a valid and reliable instrument to assess both burnout and professional fulfilment in physicians (Trockel et al., 2018). In our sample, internal consistency was 0.90 for the fulfilment scale and 0.92 for the burnout scale.

##### 3.2.2 | Depression

The Patient Health Questionnaire (PHQ-8; Kroenke et al., 2001) was administered at each timepoint and was used to assess depression symptoms. On the PHQ-8, the participant is asked to rate how frequently over the last 2 weeks they have experienced following symptoms of depression: low mood, anhedonia, hyper/hyposomnia, increased/decreased appetite, difficulty concentrating, self-blame and psychomotor retardation/agitation. Responses are recorded on a 4-point Likert scale ranging from 0 (*not at all*) to 3 (*nearly every day*). The total score of the eight items of the PHQ-8 ranges from 0 to 24, with a cut point of 10 indicating clinically significant symptoms of depression (Kroenke et al., 2009). In our sample, the internal consistency was 0.89.

##### 3.2.3 | Anxiety

The Generalised Anxiety Disorder Scale (GAD-7; Spitzer et al., 2006) was administered at each timepoint was used to assess anxiety symptoms. On the GAD-7, the participant is asked to rate how frequently over the last 2 weeks they have experienced the following symptoms of anxiety: feeling nervous, anxious or on edge; difficulty controlling worry; psychomotor agitation; trouble relaxing; general worries; fear that something terrible will happen; and irritability. Responses are recorded on a 4-point Likert scale ranging from 0 (*not at all*) to 3 (*nearly every day*). The total score of the 7 items of the GAD-7 ranges from 0 to 21, with scores exceeding 10 representing clinically significant anxiety. In our sample, the internal consistency was .93.

### 3.2.4 | Consideration and structure

The Healthcare System Communication Questionnaire (HSCQ; McDaniel et al., 1973) assessed the participants' perceptions of the styles of leadership used by their hospital administration. The HSCQ was an additional optional questionnaire in the study, meaning that not everyone who participated in the study completed the questionnaire. However, a majority of participants at each timepoint did complete the HSCQ, so we included it in our analyses. The numbers of HSCQ respondents for each timepoint, with their percentages of all survey respondents at that timepoint, were 279 (68.7%), 207 (66.3%), 171 (66.0%), 158 (64.0%) and 107 (63.7%). The HSCQ contains 14 questions about the employee's perceptions of how their leaders make decisions, communicate decisions and incorporate feedback. Each item is rated on a 5-point Likert scale from 0 (*never*) to 4 (*always*) scale.

The HSCQ has been used before in a sample of dentists (McDaniel et al., 1973), but has not been used in a broader sample of healthcare workers. Therefore, we conducted a principal components analysis with the data from the first timepoint to ensure psychometric properties before deciding to include the measure in the subsequent analyses. Before answering these questions, participants were asked to choose from three options of whom they were considering when answering the following questions: their direct supervisor ( $n = 155$ ), the head of the health system ( $n = 11$ ) and the entire leadership team ( $n = 113$ ). The principal components analysis for the HSCQ utilising the factor selection criterion of eigenvalues  $>1$  and direct oblimin rotation produced two components that accounted for 66.04% of the variance. Each item loaded more than 50% onto exactly one factor, as shown in Table 1, so we used this criterion to assign items

to factors. Of note, principal component analyses for subsamples based on whom the participants chose to rate (direct supervisor or the entire leadership team) produced similar results, so, for simplicity, only the analyses using the whole sample are reported here. In the first component, which we termed *consideration*, the highest loadings were found for 9 items regarding the degree to which leadership elicits, accepts and incorporates employee feedback in their decision-making. Analysis of the factor loadings indicated that three items should be reversed coded, and internal consistency was 0.92. In the second component, which we termed *structure*, the highest loadings were found for 5 items regarding communication and coordination of work efforts; internal consistency was 0.87.

### 3.3 | Data analysis

The statistical analyses were conducted in two parts: at baseline and longitudinally. Baseline analyses were conducted in SPSS Statistics Version 26 (IBM Corp, 2019), including the running of descriptive statistics, correlations and regression analyses. Additional exploratory analyses and longitudinal analyses were conducted in R (R Core Team, 2021) using a tidyverse workflow (Bolker & Robinson, 2021; Pedersen, 2020; Robinson et al., 2021; Wickham et al., 2019).

#### 3.3.1 | Testing of assumptions

We inspected the data for patterns relevant to regression analysis, including distributions of and correlations between topical subgroups of the measures assessed (Schloerke et al., 2021) at the

TABLE 1 Principal components analysis with direct Oblimin rotation of healthcare system questionnaire

Item	Consideration	Structure
Finds time to listen to group members	<b>0.87</b>	0.44
Makes group members feel at easy when talking to or with them	<b>0.86</b>	0.39
Gets group input on important matters	<b>0.83</b>	0.48
Puts suggestions made by the group into operation	<b>0.82</b>	0.48
Acts without consulting groups members	<b>-0.79</b>	-0.31
Willing to make changes	<b>0.78</b>	0.38
Is easy to understand	<b>0.78</b>	0.45
Refuses to explain their actions	<b>-0.76</b>	-0.18
Speaks in a manner not to be questioned	<b>-0.58</b>	0.15
Lets group members know what is expected of them	0.42	<b>0.88</b>
Sees to it that group members are working up to capacity	0.49	<b>0.81</b>
Sees to it that the work of all group members is coordinated	0.67	<b>0.77</b>
Asks that group members follow standard rules and regulations	0.19	<b>0.77</b>
Makes sure their part in the organisation is understood by all group members	0.59	<b>0.64</b>

Note: Bold values indicate which factor each variable was found to load onto.

baseline timepoint ( $n = 406$ ). We subgrouped the two mental health scores, the two measures of leadership styles and the two response variables and examined correlations between these pairs with the consideration of excluding any variables that were correlated above  $r = .90$ . Expected correlations were observed between PHQ-8 and GAD-7 ( $r = .78$ ), between HCS Consideration and Structure ( $r = .64$ ), and between burnout and fulfilment ( $r = -.60$ ); as none of the correlations exceeded our cut-off, all variables were retained in the analyses. Distributions of burnout and of fulfilment scores were similar across occupations, with the slight exception that disproportionately more nurses experienced both higher burnout and lower fulfilment.

To test the assumptions of the linear regression approach, we separately regressed each outcome variable (fulfilment and burnout) on the primary predictor (occupation, using all 4 categorical values) and the two most skewed and highly correlated predictors (PHQ-8 and GAD-7), using data from the first survey ( $n = 406$ ). Visual diagnostics for both models identified only slight deviations of the residuals from normality (QQ-plot), little heteroskedasticity (residual plots) and few highly influential points (Cook's  $D < 0.05$  and leverage  $h < 0.07$ ). Therefore, subsequent analyses were conducted using untransformed variables. Appendix S1 contains detailed results.

### 3.3.2 | Baseline regressions

We fit a nested sequence of regression models to investigate the effects of occupation, hospital leadership styles, and anxiety and depression symptoms on fulfilment and burnout at baseline. For both outcome variables, the starting model (Model 1) included occupation, Model 2 added hospital leadership styles (consideration and structure) and mental health symptoms (depression and anxiety), and Model 3 added interactions between occupation and leadership styles and psychological symptoms that were found to be statically significant in the prior models. Doctors were always taken as the reference value, so that effects were estimated only for the remaining occupations. Model fit was evaluated via the ANOVA test statistic and  $R^2$ . Because not all participants completed the HSCQ, Models 2 and 3 are fitted to fewer cases than Model 1, so these evaluation statistics were not used to select a 'best' model and instead we report the results from all models.

### 3.3.3 | Outcomes over time

Rather than the impact of date-specific events such as institutional vaccine rollouts, our longitudinal aim in this study is to detect any general improvement or worsening of burnout and fulfilment. To this end, we used survey number (1-5), a proxy for time since the first survey, as a linear predictor. In Figure 1, we give context to the longitudinal regression approach, by visually summarising the distributions of burnout and fulfilment scores across all five surveys. Across time, burnout scores were right-skewed and fulfilment scores

were left-skewed, reflecting in both cases a long tail of exceptionally poor workplace experiences. Based on visual inspection, both burnout and fulfilment worsened over the initial three timepoints, and burnout improved from the fourth to the fifth while fulfilment remained stable over the final three. These patterns may warrant further investigation with the results organised by survey completion date rather than survey number.

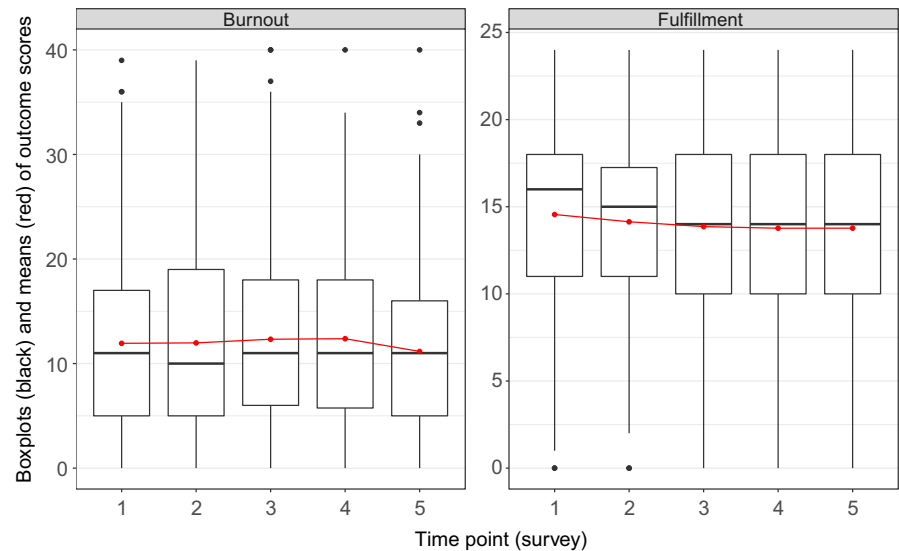
### 3.3.4 | Longitudinal regressions

As at baseline, we fit a nested sequence of longitudinal regression models, using fulfilment and burnout separately as outcome variables. All models included survey number (time). Model 1 included fixed effects of the occupations and of time. Consistent with the baseline analyses, doctors were always taken as the reference value. Like above, Gelman Betas (Gelman, 2008) were reported for standardised effect sizes. Model 2 added fixed time-varying effects of hospital leadership styles and of mental health symptoms. Model 3 added participant-level intercept and time random effects to account for participant baselines and trends. Because the interaction terms between occupation and leadership style and psychological symptoms were largely not significant at baseline and resulted in minimal change in  $R^2$ , they were not included in the longitudinal models. The interaction terms between time and occupation, which represent occupational trends, were not significant in our exploratory analyses and were not included in the final model. Because the random effects of time in Model 3 were small and the interactions between time and occupation were non-significant, no other interactions with time were explored. We evaluated model fits using  $R^2$ , including conditional  $R^2$  for mixed-effects models (Lüdtke et al., 2021; Nakagawa et al., 2017), log-likelihood and the akaike information criterion (Burnham & Anderson, 2004). As at baseline, Models 2 and 3 were fit to fewer cases than Model 1, so we did not perform model selection but instead report results from all three models.

To inform our choice of sample for longitudinal regressions, we investigated patterns of missingness in the data. In addition to participant drop-off, later timepoints include responses by participants who did not complete previous surveys. We tabulated these patterns and visualised them using an alluvial plot (Brunson, 2020). We constructed a corresponding plot based on completed surveys with HSCQ, which exhibited qualitatively the same patterns. The results informed our choice of constraints on which survey responses were used for longitudinal regression. We fit these mixed-effects models using lme4 (Bates et al., 2015). Model specifications are included in Appendix S1.

For direct interpretation, we report unstandardized effect estimates from all regression models in the tables. In order to conveniently interpret and compare their magnitudes, we also report scaled effect estimates consistent with Gelman (2008): Effects of continuous predictors (consideration, structure, depression and anxiety) are multiplied by twice the standard deviations of their

**FIGURE 1** Distributions of outcomes. Distribution of outcome (Burnout and Fulfilment) scores at each timepoint (survey) of the study period. Only participants who completed at least any 4 surveys are included, though the results are qualitatively equivalent when all participants are included.



respective predictors in the data used to fit the model, while effects of categorical predictors (occupational groups) were left unscaled. Each scaled effect can be interpreted as the expected difference in the outcome, in its own units, of taking a 'high' versus 'low' value of each variable. For a continuous predictor, the high and low values are one standard deviation above and below the mean, respectively; for a categorical predictor, the high and low values are true and false. These scaled effects are also visualised in plots using point estimates and error bars. In addition, twice the standard deviations of the random effects (baseline and trend) are included, without bars, for the mixed-effects models, which can likewise be interpreted as the expected difference in the outcome of the participant having a high versus low value of the random effect. Because time does not fall along a fixed distribution, its standardised effect is omitted from the tables and plots.

## 4 | RESULTS

### 4.1 | Participants

Participants included 406 currently employed healthcare workers recruited from academic medical centres and private healthcare agencies in the United States. The exact agency and location of each participant were not collected to protect anonymity. Based on aggregate zip code data, 95.3% of participants resided in Florida, 2.8% in Georgia and 0.2% came from each of the following states: California, Indiana, Maryland, Michigan, New York, Ohio, Texas and South Carolina. For the purposes of this study, participants were categorised into four groups: Group 1, from now on termed 'doctors', consisted of 102 participants working as independent healthcare providers including those with doctorates: physicians, psychologists, pharmacists, dentists, nurse practitioners and others with advanced degrees: physical therapists, occupational therapists and mental health counsellors. Group 2 ('nurses') consisted of 94 nurses from both inpatient and outpatient services. Group 3 ('technicians')

consisted of 90 medical assistants and technicians including pharmacy and respiratory technicians. Finally, Group 4 ('non-providers') consisted of 120 healthcare workers who did not provide direct patient care, including clinic managers, receptionists, research assistants, housekeeping and fiscal specialists. Demographics by group are shown in Table 2.

#### 4.1.1 | Baseline regressions

Results are shown in Table 3 for burnout and Table 4 for fulfilment. We found that nurses experienced significantly more burnout and less fulfilment than doctors. In the whole sample, increased levels of organisational structure were associated with decreased burnout and increased fulfilment. Increased levels of consideration were associated with increased fulfilment but was not associated with burnout. Meanwhile, higher levels of depressive symptoms, but not anxiety symptoms, were related to increased burnout and decreased fulfilment. The interactions of occupation with leadership style and with depression were not significant in the depression model and led to reduced  $F$  values and non-significant  $R^2$  change ( $R^2$  change = .004,  $p$  = .762), indicating poorer model fit. Similarly, the interactions of occupation with consideration and depression were not significant in the fulfilment model, though the interaction of nursing with structure was significant at  $p$  = .045. Visualisation of the mean fulfilment score for nurses relative to doctors at one standard deviation above and below the mean of structure indicates that structure has a stronger relationship to fulfilment for nurses than it does for doctors (Figure 2). However, including these interaction terms in the fulfilment model also led to reduced  $F$  values and non-significant  $R^2$  change ( $R^2$  change = .015,  $p$  = .080), indicating poorer model fit. Therefore, there does not appear to be any occupation-specific impact of hospital leadership or mental health symptoms on either burnout or fulfilment. In the best-fitting model of workplace burnout, the strongest predictors were organisational structure and depression symptoms. In the

TABLE 2 Demographics by profession

	Doctors (%)	Nurses (%)	Technicians (%)	Non-providers (%)	$\chi^2$
Racial groups					
Asian	13.7	3.2	5.6	1.7	48.01, $p < .001$
Black/African American	8.8	8.5	12.2	23.3	
Multiracial	4.9	3.2	8.9	0.8	
Native American	1.0	0	0	1.7	
White	71.6	85.1	65.6	67.5	
Missing	0	0	7.7	5	
Ethnicity					
Hispanic	11.8	6.4	17.8	8.5	7.09, $p = .07$
Missing	0	4.3	2.2	2.5	
Gender					
Female	69.6	92.6	81.1	84.9	21.89, $p < .001$
Male	30.4	7.4	15.6	14.3	
Other	0	0	0	0.8	
Missing	0	0	3.3	0	
	M (SD)	M (SD)	M (SD)	M (SD)	
Age	37.5 (10.3)	38.8 (9.9)	35.8 (11.6)	40.5 (12.7)	2.90, $p = .04$
Missing	13.7	12.8	12.2	9.2	

TABLE 3 Stepwise regression findings for burnout

	B (95% CI)	$\beta$	$p$	F	df	$p$	R <sup>2</sup>
Model 1							
Nurses	2.84 (0.51 to 5.17)	2.84	.017	4.20	3, 402	.006	.03
Technicians	0.69 (-1.67 to 3.04)	0.69	.568				
Non-clinical	-1.14 (-3.33 to 1.06)	-1.14	.309				
Model 2							
Nurses	0.28 (-1.78 to 2.34)	0.28	.792	27.85	7, 271	<.001	.42
Technicians	-1.80 (-3.94 to 0.34)	-1.80	.099				
Non-clinical	-3.31 (-5.53 to -1.08)	-3.31	.004				
Consideration	-0.12 (-0.36 to 0.12)	-1.00	.323				
Structure	-0.32 (-0.56 to -0.07)	-2.62	.011				
Depression	0.91 (0.66 to 1.15)	9.67	<.001				
Anxiety	-0.08 (-0.30 to 0.15)	-0.83	.509				
Model 3							
Nurses	1.17 (-6.41 to 8.75)	1.17	.762	17.75	11, 267	<.001	.42
Technicians	-2.14 (-4.36 to 0.08)	-2.14	.059				
Non-clinical	-5.22 (-14.91 to 4.47)	-5.22	.290				
Consideration	-0.12 (-0.36 to 0.12)	-1.01	.325				
Structure	-0.36 (-0.66 to -0.06)	-2.93	.021				
Depression	1.01 (0.71 to 1.30)	10.76	<.001				
Anxiety	-0.08 (-0.31 to 0.14)	-0.86	.497				
Nurses × structure	0.02 (-0.43 to 0.47)	0.17	.927				
Nurses × depression	-0.21 (-0.56 to 0.14)	-2.29	.228				
Non-clinical × structure	0.15 (-0.42 to 0.71)	1.22	.607				
Non-clinical × depression	-0.09 (-0.51 to 0.34)	-0.92	.689				

Abbreviations: B, unstandardized effect estimate with 95% confidence intervals;  $\beta$ , Gelman (2008) standardised effect estimate.



TABLE 4 Stepwise regression findings for fulfilment

	B (95% CI)	$\beta$	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>	<i>R</i> <sup>2</sup>
Model 1							
Nurses	-2.86 (-4.35 to -1.38)	-2.86	<.001	5.25	3, 402	.001	.04
Technicians	-1.93 (-3.43 to -0.43)	-1.93	.012				
Non-clinical	-1.10 (-2.50 to 0.29)	-1.10	.122				
Model 2							
Nurses	-1.46 (-2.80 to -0.11)	-1.46	.034	26.19	7, 271	<.001	.40
Technicians	-0.41 (-1.80 to 0.98)	-0.41	.559				
Non-clinical	-0.07 (-1.52 to 1.38)	-0.07	.927				
Consideration	0.28 (0.13 to 0.43)	2.36	<.001				
Structure	0.24 (0.08 to 0.40)	2.00	.003				
Depression	-0.33 (-0.48 to -0.17)	-3.48	<.001				
Anxiety	-0.07 (-0.21 to 0.08)	-0.74	.364				
Model 3							
Nurses	-7.64 (-14.34 to -0.93)	-7.64	.026	19.28	10, 268	<.001	.42
Technicians	-0.46 (-1.86 to 0.94)	-0.46	.521				
Non-clinical	-0.04 (-1.48 to 1.41)	-0.04	.962				
Consideration	0.29 (0.12 to 0.47)	2.45	.001				
Structure	0.14 (-0.05 to 0.32)	1.12	.155				
Depression	-0.34 (-0.52 to -0.17)	-3.65	<.001				
Anxiety	-0.06 (-0.21 to 0.08)	-0.67	.408				
Nurses × consideration	0.03 (-0.34 to 0.40)	0.24	.880				
Nurses × structure	0.36 (0.01 to 0.70)	2.94	.045				
Nurses × depression	0.08 (-0.13 to 0.30)	0.90	.438				

Abbreviations: B, unstandardized effect estimate with 95% confidence intervals;  $\beta$ , Gelman (2008) standardised effect estimate.

best-fitting model of workplace fulfilment, the strongest predictors were leadership consideration, organisational structure and depression symptoms.

#### 4.1.2 | Longitudinal analyses

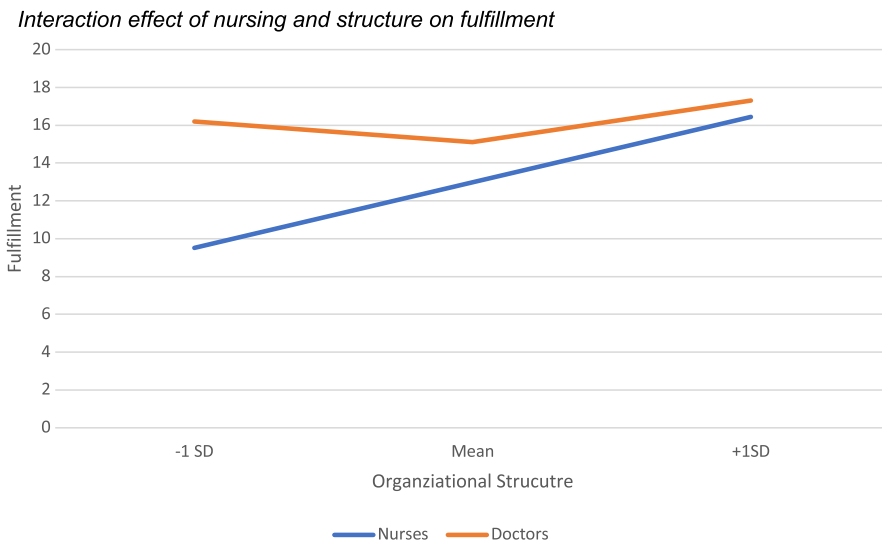
##### Missingness

The 406 participants who completed the first survey were roughly evenly distributed across the four occupations. The alluvial plot in Figure 3 summarises their participation in follow-up surveys. The total number of respondents for each subsequent survey time-point dropped to 312 for survey two, 259 for survey 3, 247 for survey 4 and 168 for survey 5. The number of respondents is represented by the heights of the stacked bars in the alluvial plot, and the ribbons that dip below the abscissa represent the several participants who returned for later surveys after missing one or more. For our longitudinal analyses of burnout, we used data from the 234 participants who completed at least any 4 of the 5 surveys resulting in a sample of 56 doctors, 55 nurses, 46 technicians and 77 non-providers. Of these, 144 (44 doctors, 48 nurses, 28 technicians and 24 non-providers) completed the HSCQ and were

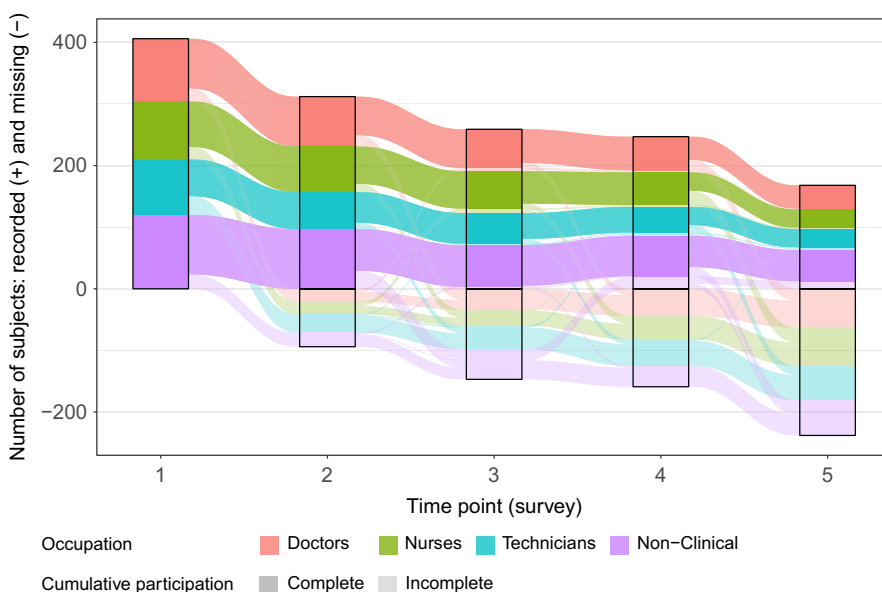
included in Models 2 and 3. The total numbers for fulfilment were 232 and 143. As a robustness check, we repeated all longitudinal analyses using data from those participants who completed at least the first four surveys (reported in Appendix S1) (Tables 5 and 6).

##### Occupation

The baseline finding that nurses reported increased burnout and decreased fulfilment relative to doctors was replicated in the fixed-effects longitudinal models (Model 1). We also found that, relative to doctors, technicians experienced greater burnout and less fulfilment, though to a lesser degree than nurses. Finally, non-providers reported slightly less fulfilment relative to doctors. When the fixed effects of the hospital leadership styles and mental health variables were added (Model 2), nursing became undetectable as a predictor of burnout. This means that, for burnout, organisational structure and mental health symptoms could account for nurses' higher burnout rates, though nursing remained a significant predictor of lower fulfilment even when accounting for leadership styles and mental health symptoms. Interestingly, these factors also accounted for the lower fulfilment rates of technicians and non-providers but revealed lower rates of burnout among these HCWs after being accounted for. Finally, the



**FIGURE 2** Estimates of interaction effect between nursing occupation and organisational structure on fulfillment. Each line represents level of fulfillment for nurses only and doctors only at one standard deviation above, below and at the mean of organisational structure as measured at baseline.



**FIGURE 3** Alluvial plot of survey participation. The height of the bar above the abscissa at each timepoint is the number of participants who completed the survey at that timepoint, while the depth of the bar below is the number of baseline participants who did not. Each participant is represented by a thin ribbon that tracks their participation at each timepoint, and like ribbons are joined for readability. These ribbons are colour-coded by occupation. Each ribbon remains opaque until the first survey not completed.

inclusion of individual variation in baseline and trend (Model 3) had a negligible impact on the effect estimates of occupation, though it did make them too uncertain to be distinguished from zero.

*Leadership styles*

Greater individual perceptions of consideration by organisational leadership ('consideration') and perceptions of organisational structure ('structure') were related to decreased burnout and increased fulfillment, even while accounting for mental health variables. The effects of consideration were not as clear when participant baselines and trends were included (Model 3), but structure remained a strong predictor of both burnout and fulfillment. Taking the unstandardized effect estimates from Model 2, a unit improvement in structure was associated with a decrease in burnout score of 0.33, twice that due to a unit improvement in consideration. Similarly, a unit improvement in structure was associated with an increase of

0.30 in fulfillment score, compared to a 0.16 increase associated with a unit improvement in consideration.

*Psychological symptoms*

As expected, both depression and anxiety were consistently related to increased burnout and decreased fulfillment, and these effects remained clear after including participant baselines and trends. One unit increase in a participant's PHQ-8 score was associated with an increase in burnout score of 0.75, compared to 0.18 for GAD-7. GAD-7 emerged more clearly, with an effect of 0.32 on burnout, in the mixed-effects model. Likewise, unit increase in PHQ-8 was associated with a similarly-sized decrease of 0.28 in fulfillment, compared to half that decrease associated with a unit increase in GAD-7.

Because the questionnaires have different numbers of items using different scales, these unit-based interpretations convey the

TABLE 5 Longitudinal analysis of burnout

	B (95% CI)	$\beta$	p	df	LL	AIC
Model 1						
Nurses	4.50 (3.03 to 5.98)	4.5	<.001	4, 1079	-3836	7685
Technicians	1.59 (0.05 to 3.13)	1.59	.039			
Non-providers	-1.23 (-2.59 to 0.13)	-1.23	.071			
Time	-0.03 (-0.40 to 0.33)	-0.03	.850			
Model 2 (fixed effects only)						
Nurses	0.44 (-0.87 to 1.74)	0.44	.500	8, 653	-2168	4357
Technicians	-2.96 (-4.47 to -1.44)	-2.96	<.001			
Non-providers	-2.95 (-4.49 to -1.40)	-2.95	<.001			
Time	-0.13 (-0.50 to 0.23)	-0.13	.47			
Consideration	-0.22 (-0.37 to -0.07)	-1.94	.003			
Structure	-0.31 (-0.46 to -0.17)	-2.77	<.001			
Depression	0.75 (0.59 to 0.92)	8.27	<.001			
Anxiety	0.21 (0.05 to 0.37)	2.29	.010			
Model 3 (fixed and random effects)						
Nurses	0.90 (-1.41 to 3.21)	0.9	.44	-	-2015	4056
Technicians	-2.39 (-5.07 to 0.30)	-2.39	.078			
Non-providers	-2.56 (-5.34 to 0.22)	-2.56	.068			
Time	-0.06 (-0.33 to 0.21)	-0.06	.64			
Consideration	-0.09 (-0.22 to 0.04)	-0.78	.16			
Structure	-0.27 (-0.41 to -0.14)	-2.43	<.001			
Depression	0.52 (0.36 to 0.67)	5.7	<.001			
Anxiety	0.35 (0.19 to 0.50)	3.82	<.001			

Abbreviations: B, unstandardized effect estimate with 95% confidence intervals;  $\beta$ , Gelman (2008) standardised effect estimate; LL, log likelihood; AIC, akaikie information criterion.

importance of the individual items but not of the total scores. The scaled estimates in Figure 4 reveal that, overall, depression is an outsized predictor of both burnout and fulfilment, while anxiety and structure are of similar importance. Also, while the effects of occupation become harder to detect as other fixed effects and random effects are included, some of their effect estimates remain similar in magnitude. This suggests that they cannot be explained as artefacts of individual differences but remain important in our understanding of burnout and fulfilment. Finally, while individual participants established significantly different baseline values of burnout and fulfilment, greater in variation than any fixed effect, they did not exhibit a wide range of trajectories over the study period. This indicates that, while participants varied widely in their reported experiences of burnout and fulfilment, the trends we observed were widely shared.

## 5 | DISCUSSION

In this study, we found that, both at baseline and over the course of 5 months, nurses working during the COVID-19 pandemic reported increased burnout and decreased fulfilment relative to doctors. The strongest predictors of both burnout and fulfilment were perceived organisational structure and depressive symptoms, both at baseline

and across time. However, leadership consideration and anxiety symptoms were also predictive of both burnout and fulfilment in the longitudinal analyses.

When predicting these outcomes from occupation alone, nurses evidenced increased burnout and decreased fulfilment relative to doctors both at baseline and across time. Moreover, while technicians were found to have more burnout and technicians and non-providers both were found to have less fulfilment relative to doctors, nursing still had a differential impact. The magnitude of the effect of nursing was close to three times that of the technician occupation for burnout and one-and-a-half times that of the technician occupation for fulfilment. These findings underscore the vulnerability of nurses for developing poor work attitudes (i.e. reduced fulfilment and burnout) and are consistent with previous research which highlights the unique stresses of nursing (Barello et al., 2020). As additional predictors were added into the models (leadership consideration, organisational structure, anxiety symptoms and depression symptoms), the estimated effect of nursing became both smaller and less precise, meaning that those variables likely accounted for some of the differences in rates of burnout and fulfilment. This does not mean that the role of nursing became less important; instead, it means that nurses experience these contributing factors at greater rates than HCWs in other occupations. Therefore, by addressing these variables, nursing

TABLE 6 Longitudinal analysis of fulfilment

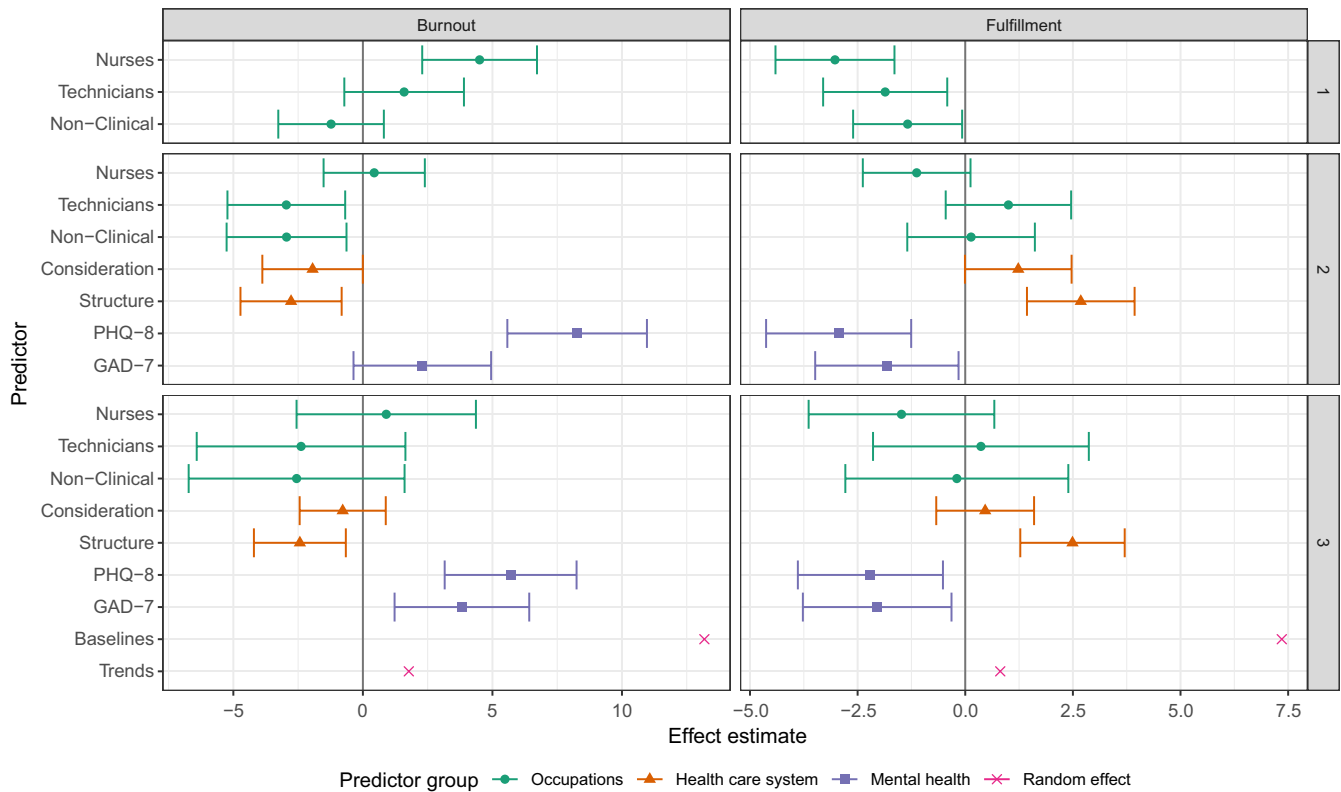
	B (95% CI)	$\beta$	<i>p</i>	<i>df</i>	LL	AIC
Model 1						
Nurses	-3.03 (-3.95 to -2.10)	-3.03	<.001	4, 1070	-3293	6597
Technicians	-1.86 (-2.82 to -0.90)	-1.86	<.001			
Non-providers	-1.34 (-2.18 to -0.49)	-1.34	.002			
Time	-0.23 (-0.46 to 0.00)	-0.23	.047			
Model 2						
Nurses	-1.13 (-1.96 to -0.29)	-1.13	.007	8, 649	-1861	3743
Technicians	1.00 (0.03 to 1.97)	1.00	.039			
Non-providers	0.14 (-0.85 to 1.12)	0.14	.780			
Time	-0.20 (-0.44 to 0.03)	-0.20	.087			
Consideration	0.14 (0.05 to 0.24)	1.23	.003			
Structure	0.30 (0.21 to 0.40)	2.68	<.001			
Depression	-0.28 (-0.38 to -0.17)	-2.94	<.001			
Anxiety	-0.17 (-0.27 to -0.07)	-1.82	.001			
Model 4						
Nurses	-1.48 (-2.92 to -0.04)	-1.48	.041	-	-1749	3523
Technicians	0.36 (-1.31 to 2.03)	0.36	.660			
Non-providers	-0.20 (-1.92 to 1.53)	-0.20	.820			
Time	-0.25 (-0.42 to -0.08)	-0.25	.005			
Consideration	0.05 (-0.03 to 0.14)	0.46	.220			
Structure	0.28 (0.19 to 0.37)	2.49	<.001			
Depression	-0.21 (-0.31 to -0.10)	-2.20	<.001			
Anxiety	-0.19 (-0.30 to -0.08)	-2.05	<.001			

Abbreviations: B, unstandardized effect estimate with 95% confidence intervals;  $\beta$ , Gelman (2008) standardised effect estimate; LL, log likelihood; AIC, akaïke information criterion.

leadership may be able to reduce the rates of burnout and improve the sense of fulfilment among their staff.

Organisational structure was routinely found to be a strong predictor of both burnout and fulfilment, and, consequently, is an excellent target for intervention. When trying to improve their level of structure, leadership should make roles and responsibilities clear, equally hold employees to standards and regulations, and foster organisation and cooperation among employees. The other leadership style that was evaluated in this study was consideration. Consideration was found to have smaller effects on burnout and fulfilment and was more strongly related to fulfilment, though is still worth incorporating into any leadership changes. When trying to improve their level of consideration, leadership should both seek to solicit and incorporate employee feedback in a manner that demonstrates willingness to hear continued feedback, open communication and lacking defensiveness. Additionally, no significant differences were noted between employees who considered the hospital system versus their direct supervisor when reporting on leadership style, indicating that the variables are important at all levels of leadership. These findings are consistent with research published before the COVID-19 pandemic, which found that organisational support was related to job satisfaction in nurses (Labrague et al., 2018).

Another strong and reliable predictor of increased burnout and reduced fulfilment was depression symptoms. Anxiety also showed a clear relationship to increased burnout and decreased fulfilment in longitudinal analyses, but this relationship was weaker than that observed with depression. Even prior to the pandemic, healthcare workers, especially nurses, were at increased risk of developing mental health symptoms including depression and anxiety, and these findings are consistent with previous studies finding a strong relationship between psychological symptoms and work attitudes (Peterson et al., 2008). Consequently, healthcare systems would be wise to expand their offerings of mental health services to their employees. Such interventions can and should take varying forms so as to appeal and apply to the most individuals. The introduction of legislation like the Dr. Lorna Breen Health Care Provider Protection Act is also a promising start in providing funding and national support for efforts to improve mental health resources for healthcare workers. In the meantime, common workplace interventions include expansions of employee assistance programs to include more providers and allow for longer treatment, flexible scheduling to allow time for treatment, on-line trainings focusing on psychoeducation and online individual counselling programs.



**FIGURE 4** Standardised effect estimates and three standard deviation confidence intervals from the nested sequence of longitudinal regression models of burnout and fulfilment. Effects of dummy indicators for categorical predictors are unadjusted, effects of continuous predictors are multiplied (equivalent to having divided the predictors) by twice the standard deviations of the predictors, and distributions of random effects are represented by twice their standard deviations.

Finally, this study was unique in its ability to evaluate the role of time. The longitudinal regression analyses indicated that burnout did not change significantly across five survey timepoints, though they detected a small decrease in fulfilment. These findings are consistent with longitudinal evaluations of work attitudes, workplace variables and mental health symptoms in Italian HCW (Magnavita, Soave, & Antonelli, 2021a, 2021b). Most notably, in the context of COVID-19, the conventional wisdom has been that burnout and fulfilment would improve as the conditions of the COVID-19 pandemic improved, including access to vaccines. That was not observed here, and the linear analyses indicated that our HCW faced unyielding burnout and worsening fulfilment. Moreover, by increasing the power of our analysis and accounting for the effect of time, these longitudinal models were better able to detect the effects of the time-varying factors of leadership styles and mental health symptoms. One caveat is that there seem to be some nonlinear trends in fulfilment and burnout that were not able to be investigated here; therefore, there may be some subtleties in the relative improvements and worsening of burnout and fulfilment that we did not capture. Nevertheless, these effects are likely small and intentional interventions are still needed to have meaningful impact on professional attitudes among healthcare workers.

We believe this study has several notable strengths, including its longitudinal design and ability to capture the before and after picture of the vaccine rollout for healthcare workers and the substantial, albeit short-lived, improvements in conditions of the pandemic in spring 2021. Additionally, this study included a wide sample of healthcare workers, including assistants and technicians as well as non-clinicians, thus diverging from the common doctor-nurse dichotomy. This design allowed for the consideration of often overlooked yet essential members of our healthcare system and highlighted the unique challenges of nursing. Moreover, this sample enabled the inclusion of more racial and ethnic minority participants.

There were also some weaknesses of this study to be considered in generalising the results and informing future study designs. Most notably, this sample was drawn from one geographic region and participants were mostly white American women. Additional studies in other healthcare systems and with more diverse participants would lend support to the generalisation of these findings. Additionally, the sample size in this study was reduced due to one of the questionnaires being optional. While the associated limit in statistical power did not appear to impact our ability to find fixed effects, it may have limited our ability to discern interaction effects among occupation, hospital leadership and mental health symptoms, as well as to characterise changes over time.

## 6 | CONCLUSION

This study indicates that healthcare workers continue to face burnout and reduced fulfilment in their jobs, with nurses being at most risk. Burnout and fulfilment did not improve even with significant improvements in the conditions of the COVID-19 pandemic including access to vaccines and significant, although temporary, reductions in new cases and hospitalizations. The strongest predictors of burnout and fulfilment were the degree of structure in hospital leadership and depressive symptoms. As the COVID-19 pandemic wears on, we hope this study can provide evidence-based guidance for hospital leadership to protect and improve the well-being of our front-line care teams.

## 7 | RELEVANCE TO CLINICAL PRACTICE

This study adds to existing literature documenting the vulnerability of healthcare workers, especially nurses to burnout and low fulfilment during the COVID-19 pandemic. Poor work attitudes have negative mental health consequences for healthcare workers and poorer patient outcomes. Hospital leadership wishing to improve work attitudes should improve organisational structure, increase consideration of employee opinions, and provide and encourage use of employee wellness resources for depression and anxiety.

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### CONFLICT OF INTEREST

The authors have no conflicts of interest to disclose.

### DATA AVAILABILITY STATEMENT

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

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## SUPPORTING INFORMATION

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