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# Sense of coherence moderates job demand-resources and impact on burnout among nurses and midwives in the context of the COVID-19 pandemic: A cross-sectional survey

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## Abstract

**Aim:** This study aimed to test the propositions using the job demands-resources (JD-R) model for main/moderation/mediation effects of a sense of coherence and practice environment support on mental well-being (anxiety, depression and burnout) outcomes in nurses and midwives in Australia during the COVID-19 pandemic.

**Design:** Cross-sectional quantitative survey.

**Data Sources:** The study was a cross-sectional design using self-report questionnaires reported as per the Reporting of Observational Studies in Epidemiology Guidelines. Following human research ethics approval (2020.ETH.00121) participants were recruited to take part in an online anonymous survey using self-report instruments to test the JD-R model in Australia.

**Results:** 156 participant nurses and midwives experienced anxiety, depression and emotional burnout during COVID-19. While a considerable proportion of participants indicated high levels of emotional exhaustion, their responses showed low levels of depersonalization (detached response to other people) and high levels of personal accomplishment (high levels of work performance and competence). A sense of coherence was a significant protective factor for mental health well-being for the participants, which is to say, high levels of sense of coherence were predictive of lower levels of anxiety, depression and burnout in this study sample.

**Conclusion:** It is evident that both nursing and midwifery professions require psychosocial support to preserve their health both in the short and long term. Ensuring individualized tailored support will require a layered response within organizations aimed at individual self-care and collegial peer support.

**Patient or Public Contribution:** There was no patient or public contribution in this study, as the focus was on nurses and midwives.

## KEYWORDS

burnout, COVID-19, pandemic, midwifery, nursing, quantitative study

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## 1 | INTRODUCTION

In December 2019, a deadly infectious outbreak started in Wuhan, China, known as the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2 or more commonly referred to as “COVID-19”). To date, there have been 7,026,465 deaths and a total of 774,469,939 people infected by COVID-19 (World Health Organization [WHO]; 2023). Specifically, evidence has identified that the number of deaths due to COVID-19 among healthcare workers was 115,493, but these figures are likely to be inaccurate and under-reported (WHO, 2021). Data have supported that there were approximately 27.9 million nurses employed at the start of the global pandemic (McCarthy et al., 2020) and are likely to have experienced workplace stress and trauma as the pandemic has played out (Boyden & Brisbois, 2023). Simultaneously, it was estimated that there were at least 116 million babies born during the pandemic, with millions of women requiring care from maternity staff, consequently, midwives have also reported negative mental health impacts (Schmitt et al., 2021).

Evidence has underscored that the workforce has faced immense job-associated stress, little control over their professional environment and a perception of betrayal from governments and healthcare authorities during this time (Aksoy & Koçak, 2020; Bennett et al., 2020; Corbett et al., 2020; Foli et al., 2021). Chronic stress in the workplace leads to work-related burnout (WRB), which is typically characterized by frustration with the workplace, decreased work achievement and exhaustion (Dall'Ora et al., 2020; Maslach & Jackson, 1981). The experience of burnout is a frequent and significant issue which has important implications for nurses and midwives themselves and also can impact upon the delivery of care, clinical teams, and the health system overall (Doherty & O'Brien, 2023; Lima et al., 2023).

Burnout was first described by Freudenberger (1974) when he reported that a loss of motivation and work commitment was observed in mental health volunteer workers; however, it was Maslach who developed the self-reported burnout scale, the Maslach Burnout Inventory (Maslach et al., 1997; Maslach & Jackson, 1981). The Maslach Burnout Inventory has been the most commonly used instrument among nurses and midwives during the COVID-19 pandemic (Galanis et al., 2021). Conceptually, burnout is a consequence of excessive stress at work, accompanied by feelings of being drained emotionally – Emotional Exhaustion; by detached response to other people – Depersonalization, and thirdly, by reduced feelings in work performance and competence – reduced Personal Accomplishment (Maslach, 1998).

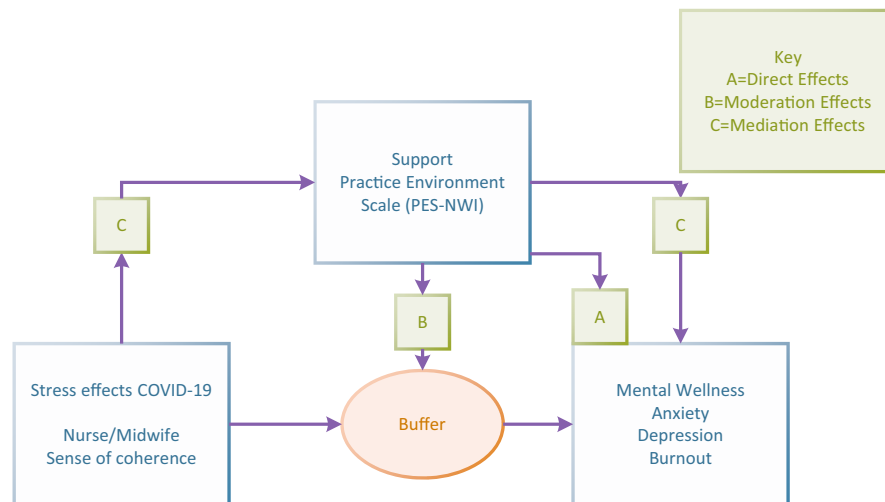
The job demands-resources (JD-R) model (Demerouti et al., 2001) builds on the conceptualization of burnout proposing that burnout develops from two separate pathways: (1) excessive job demands lead to exhaustion and (2) insufficient job resources lead to disengagement in the workplace. The main concern documented by healthcare staff during the COVID-19 outbreak was

the fear of bringing the virus to their home and families (Chen et al., 2020). Staff also articulated a lack of support regarding how to manage patients when they were unwilling to be quarantined at the hospital, or when patients did not cooperate with medical measures because of panic (Chen et al., 2020). Staff have also experienced moral distress at having to keep family separated from patients, particularly those that may be dying, in order to minimize infectious risk; and have also experienced ethical issues related to the triaging of resources and advising families about socially restrictive practices (Jackson et al., 2023). Finally, staff articulated concerns about the shortage of personal protective equipment (PPE) and feelings of incapability when faced with critically ill patients and difficult decision-making in the rationing of continuous positive airway pressure (CPAP) and ventilators (Bennett et al., 2020; Chen et al., 2020; Foli et al., 2021). While existing studies have reported on burnout experienced by nurses and midwives during the pandemic (Aksoy & Koçak, 2020; Christianson et al., 2023; Galanis et al., 2021) and the effects of the workplace environment (i.e., psychosocial safety climate [PSC]) exhaustion in healthcare workplaces (see for example, Zadow et al., 2017), little is known about the extent to which workplace and individual factors, such as sense of coherence, buffer the effects of workplace stress on mental well-being during the COVID-19 pandemic in the Australian context. A safe and healthy work environment is associated with greater job satisfaction and staff retention, along with improved patient outcomes (Swiger et al., 2017).

### 1.1 | Theoretical framework

This study was informed and developed by the job demands-resources (JD-R) model (Demerouti et al., 2001; Jourdain & Chênevert, 2010) that proposes a lack of resources in combination with high work demands contributes towards the development of burnout among nurses and midwives. Reductions in resources accompanied by increased work-related demands have been well-documented during the COVID-19 pandemic, but a knowledge gap remains about how this impacted nurses and midwives in the Australian setting (Foli et al., 2021; Galanis et al., 2021). Developing and refining our theoretical understanding of the mechanism of how coping and environmental support can influence anxiety, depression, and burnout is the first stage of the UK Medical Research Councils framework for complex interventions (Skivington et al., 2021), to develop future interventions that are appropriately targeted, and theoretically driven to address workforce support needs. See Figure 1 for proposed theoretical model. This study aimed to test the propositions using the JD-R model for main/moderation/mediation effects of sense of coherence and practice environment support on mental well-being (anxiety, depression and burnout) outcomes in nurses and midwives.

**FIGURE 1** The modified job demands-resources model (Demerouti et al., 2001) used in this study.



## 2 | METHOD

### 2.1 | Design

The study was a cross-sectional design using self-report questionnaires as per the Reporting of Observational Studies in Epidemiology Guidelines (von Elm et al., 2007) (see Supplementary Table S1 for completed checklist). All registered nurses and registered midwives irrespective of the length of experience, role, setting, educational level who practised within a metropolitan Australian setting (approximately 6000 nurses/midwives) who were working in either hospital or community settings were invited to take part in the study between October 2020 and November 2021.

### 2.2 | Ethical considerations, participants and procedure

Following human research ethics approval (2020.ETH.00121), participants were recruited to take part in an online anonymous survey via email sent from the Clinical Chairs in Nursing (CP) and Midwifery (DD), with a letter of invitation explaining the study and provided a link to the study. Two hundred and twenty-one participants initially started the online survey; however, 39 participants did not complete the main measures and a further 26 were removed due to careless and inattentive responding (CIR; see below). The final sample ( $n=156$ ) consisted of 142 females, 13 males and one person who identified as "other." Participants' ages ranged from 22 to 63 years ( $M_{Age}=43.75$ ,  $SD_{Age}=11.34$ ), and they had on average 19.5 years of experience ( $Md=18.5$  years,  $SD=12.57$  years), with some working as a nurse or midwife for as little as 4 months through to 44 years. Access details for psychological support were made available to all participants on the participant information form and within the online survey. Following the completion of the survey, participants were invited to participate in an interview (findings from these data are reported elsewhere).

## 2.3 | Measures

### 2.3.1 | Demographic variables

There is some evidence that certain participant characteristics have been linked to poorer mental health outcomes during pandemics (Philip & Cherian, 2020). Those specifically related to COVID-19 have included gender, professional role, workplace setting and those considered to be frontline workers, due to increased risk of exposure to the virus (Spoorthy et al., 2020). Therefore, we collected self-reported demographic data from the participants, including occupation: nursing/midwifery, gender, years of age and years of experience.

### 2.3.2 | Mental health

#### Anxiety

We assessed symptoms of generalized anxiety using the 7-item Generalized Anxiety Disorder scale (GAD-7; Spitzer et al., 2006). The GAD-7 has good psychometric properties (Spitzer et al., 2006) and has been used in other healthcare settings assessing including health professionals in the context of COVID-19 (e.g., Kang et al., 2020; Lai et al., 2020). Participants rated the frequency of experiencing symptoms (e.g., "being so restless that it is hard to sit still") over the previous two weeks on a 4-point scale (0=*not at all*; to 3=*nearly every day*). The scale demonstrated good internal consistency, with items summed to give a total score of generalized anxiety, with higher scores representing more difficulties (see Table 1 for  $\alpha$ ,  $M$  and  $SD$ ). Clinical cut-offs for the GAD-7 suggest scores of 0–4 represent normal levels of symptoms, 5–9 represent mild levels of symptoms, 10–14 moderate levels of symptoms and scores of 15–21 are indicative of severe levels of symptoms. Participants also rated the extent to which their symptoms impacted on their work, their ability to take care of things at home and their relationships with others (1=*not difficult at all*; 4=*extremely difficult*).

Variables	M	SD	$\alpha$
Mental health			
GAD-7	5.26	4.17	.88
PHQ-9	5.37	4.09	.82
MBI-EE	24.03	13.27	.93
MBI-Dep	5.20	5.17	.76
MBI-PA	37.26	6.80	.71
Sense of Coherence (Total)	63.42	12.80	.86
Manageability	18.35	4.60	.62
Meaningfulness	22.04	4.19	.71
Comprehensibility	23.02	5.65	.71
Practice Environment Scale of the Nursing Work Index			
Nurse Participation in Hospital Affairs	2.61	0.60	.88
Nursing Foundations for Quality Care	2.82	0.52	.88
Nurse Manager Ability, Leadership and Support	2.77	0.70	.88
Staffing and Resource Adequacy	2.77	0.70	.84
Collegial Nurse-Physician Relations	2.93	0.55	.81

TABLE 1 Means, standard deviations and Cronbach's Alphas of the study measures.

### Depression

To measure symptoms of depression, participants completed the Patient Health Questionnaire. Similar to the GAD-7 (Spitzer et al., 2006), the measure also has good reported psychometric properties (Kroenke & Spitzer, 2002) and has been used for assessing health professionals mental health during COVID-19 (Kang et al., 2020; Lai et al., 2020). The measure asks participants to indicate the frequency of experiencing various symptoms indicative of depression (e.g., "feeling down, depressed, or hopeless") on a 4-point scale (0 = *not at all*; 3 = *nearly every day*). The items demonstrated good internal consistency (see Table 1) and were summed to create an index of symptoms of depression, with higher scores indicative of greater symptom severity. Clinical cut-offs for the PHQ-9 suggest scores of 0–4 represent normal levels of symptoms, 5–9 represent mild levels of symptoms, 10–14 moderate levels of symptoms, scores of 15–19 moderately severe levels of symptoms and 20–27 are indicative of severe levels of symptoms.

### Burnout

We employed the use of the 22-item Maslach Burnout Inventory-Human Services Survey (MBI-HSS; Maslach et al., 1997); the original version of the scale. The MBI-HSS has good psychometric properties and has been widely used to assess burnout within health professional populations (see for example, Barello et al., 2020; Giusti et al., 2020; Wu et al., 2020). Participants rate the frequency of experiences in relation to their job (e.g., "I feel emotionally drained") on a 7-point scale (0 = *never*; 6 = *every day*). The MBI has three subscales: Emotional Exhaustion (EE); Depersonalization (Dep) and Professional Accomplishment (PA). The items on each of the subscales demonstrated adequate to good internal consistency (see Table 1) and were summed to create indices of each of the facets of burnout. The scores on each of the subscales can also be interpreted as high, moderate or low severity of indicators of burnout (EE, Dep) or protective factors (i.e., PA).

### 2.3.3 | Work-related stress

The 13-item Sense of Coherence (SOC) scale (Antonovsky, 1993) was used to measure nurses' ability to deal with stressors as a reflection of their perception that the world is meaningful and predictable (Lerdal et al., 2017). Sense of coherence is considered a determinant of well-being and an element of personal resilience that is associated with adaptability, satisfaction and the ability to manage stressors in the workplace. It has been identified as a protective factor for health professionals in managing unpredictability (Gómez-Salgado et al., 2020). The measure has three subscales (comprehensibility [5 items], meaningfulness [4 items] and manageability [4 items]) and can be interpreted at either the subscale level or as a total score; we chose to use the latter in the current study. Participants rate items on a 7-point semantic differential scale specific to the content of each item. The items on the subscales produced acceptable internal consistency, with total items having good internal consistency (see Table 1); higher scores are indicative of a greater sense of coherence, reflective of less work-related stress.

### 2.3.4 | Organizational characteristics and support

The extent to which nurses experienced support in their organizations was measured with the 30-item, five subscale Practice Environment Scale of the Nursing Work Index (PES-NWI; Lake, 2002). The five subscales are as follows: Nurse Participation in Hospital Affairs (9 items); Nursing Foundations for Quality of Care (10 items); Nurse Manager Ability, Leadership and Support of Nurses (5 items); Staffing and Resource Adequacy (4 items); and Collegial Nurse-Physician Relations (3 items). The items on each of the subscales demonstrated good internal consistency (see Table 1) and were therefore respectively averaged to provide composite scores for each subscale.

## 2.4 | Statistical analysis

All analyses were conducted using SPSS Version 28 (IBM Corp, 2021). Initial analyses were conducted to check for careless and inattentive responding (CIR) and missing values (MVA), followed by basic descriptive statistics for mental health outcomes. The main hypotheses were tested using Hayes (2022) PROCESS Macro for SPSS (PROCESS Model 1). As recommended by Hayes (2022) we used 10,000 bootstrapping resamples for the analyses to produce 95% bias-corrected confidence intervals (CIs), with results considered statistically significant when the CIs do not cross zero.

## 3 | RESULTS

### 3.1 | Preliminary analyses

#### 3.1.1 | Careless and inattentive responding

We conducted a CIR analysis (Curran, 2016; Huang et al., 2012; Marjanovic et al., 2015; Meade & Craig, 2012) to check the quality of the data and to ensure participants were not responding in a careless or inattentive way. Survey completion time was the selected method to examine the quality of the data (Curran, 2016; Huang et al., 2012; Marjanovic et al., 2015; Meade & Craig, 2012). The average completion time of the survey ( $M=19:21$  min,  $SD=6:22$  min) and cut-offs to identify participants with quick response times were calculated based at one standard deviation below the mean, with participants with a completion time less than this removed from the data set (i.e., we determined it was unlikely participants accurately completed the survey in less than 12:59 min while paying attention).

#### 3.1.2 | Missing values analyses

A missing values analysis (MVA) was conducted indicating that less than 5% of the data were missing with a Little's MCAR test (Little, 1988) revealing that data that were missing were at random ( $\chi^2=1449.567$ ,  $p=.806$ ). Expectation maximization replacement was conducted to replace those missing values to create a complete dataset.

#### 3.1.3 | Mental health descriptives

##### Anxiety

Nearly half of the sample (47.4%) reported symptoms in the normal range, 36.5% reported symptoms in the mild range, 13.5% reported symptoms in the moderate range and 2.6% reported symptoms in the severe range. Consistent with most people reporting symptoms in the normal range, most of the sample did not

report a high level of impact of their symptoms on their daily lives ( $M=1.71$ ,  $SD=0.59$ ).

##### Depression

Just over half the sample (51.9%) reported symptoms in the normal range, 32.7% reported symptoms in the mild range, 13.5% reported symptoms in the moderate range, 1.9% reported symptoms in the moderately severe range and no one in the sample reported symptoms in the severe range. Consistent with most people reporting symptoms in the normal range, most of the sample did not report a high level of impact of their symptoms on their daily lives ( $M=1.67$ ,  $SD=0.57$ ).

There was a significant overlap between those who reported experiencing symptoms of anxiety and those who reported symptoms of depression, with a significant positive correlation ( $r=.75$ ,  $p<.001$ ) between scores on the GAD-7 and PHQ-9.

##### Burnout

Table 2 contains the percentages of participants in each of the descriptive categories for the subscales of the MBI. There was a large proportion of participants (41.7%) who indicated high levels of emotional exhaustion (EE), although there were also low levels of depersonalization (Dep) and high levels of personal accomplishment (48.7%).

### 3.2 | Main analyses

The full results, presented in Table 3, indicate that a sense of coherence was a significant protective factor for mental well-being (i.e., as coherence increased, symptoms of anxiety, depression and burnout decreased). Specific outcomes are presented below.

#### 3.2.1 | Anxiety

We ran five moderation analyses investigating the potential interactions of sense of coherence and organizational characteristics and support as measured by the PES-NWI on symptoms of anxiety. While all overall models were significant (see Table 3), none of the interaction terms were significant, with having a sense of coherence as the only significant predictor of symptoms of anxiety.

TABLE 2 Percentages of participants in each of the descriptive ranges for the subscales on the Maslach Burnout Inventory (MBI).

MBI subscale	Descriptive category of severity		
	Low (%)	Moderate (%)	High (%)
MBI-EE	34.0	24.4	41.7
MBI-Dep	70.5	19.9	9.6
MBI-PA	16.0	35.3	48.7

Abbreviations: Dep, depersonalization; EE, emotional exhaustion; PA, personal accomplishment.

### 3.2.2 | Depression

Five moderation analyses were conducted investigating the potential interactions of sense of coherence and organizational characteristics and support as measured by the PES-NWI on symptoms of depression, with the results similar to those for symptoms of anxiety (see Table 3). That is, all overall models were significant, with none of the interactions significant, and the sense of coherence a significant predictor of symptoms of depression.

### 3.2.3 | Burnout

A further series of 15 moderation analyses were conducted examining the potential interactions of sense of coherence and organization characteristics and support on facets of burnout (i.e., five analyses for each of the three facets of emotional exhaustion, depersonalization and personal accomplishment). See Table 3 for the full results.

#### *Emotional exhaustion*

The overall models from the five analyses predicting emotional exhaustion were all significant, and sense of coherence was also a significant predictor of emotional exhaustion in all models. Participation in hospital affairs and foundations for quality care was also significant independent predictors of emotional exhaustion.

These main effects were superseded by two significant interactions; the interaction between the sense of coherence and participation in hospital affairs on emotional exhaustion and the interaction between sense of coherence and nurse/midwife manager ability, leadership and support on emotional exhaustion. At low levels of coherence, low participation resulted in high levels of emotional exhaustion as compared to high participation, and at high levels of coherence, there were no differences in the effects of participation on emotional exhaustion (see Figure 2). Similarly, at low levels of coherence, low levels of nurse/midwife manager ability resulted in high levels of emotional exhaustion as compared to high levels of nurse/midwife manager ability, and at high levels of coherence were minimal differences in the effects of nurse/midwife manager ability on emotional exhaustion (see Figure 3).

#### *Depersonalization*

In the models predicting depersonalization, sense of coherence was the only significant predictor. All overall models were significant (see Table 3).

#### *Personal accomplishment*

For the models predicting personal accomplishment, all overall models were significant with sense of coherence as the only significant independent predictor (see Table 3).

## 4 | DISCUSSION

This theoretically driven quantitative study set out to examine the mechanism of the JD-R model (Demerouti et al., 2001; Jourdain & Chênevert, 2010) which hypothesized that a lack of resources and high work demands can contribute towards the development of burnout among nurses and midwives. To the best of our knowledge, this is the first Australian-based study to explicitly examine this model (Galanis et al., 2021) among nurses and midwives in the context of COVID-19. There are several important new insights which have been identified that are relevant for both nursing and midwifery professions. Of note, 52.6% of nurses and midwives were identified as indicating above normal levels of anxiety, 48.1% reported significant levels of symptoms of depression. While a considerable proportion of participants indicated high levels of emotional exhaustion, their responses showed low levels of depersonalization (detached response to other people) and high levels of personal accomplishment (high levels of work performance and competence). Unsurprisingly, there was a statistically significant relationship between anxiety and depression in the study sample. Our findings are in contrast to a recent systematic review (Galanis et al., 2021), whereby the nurses and midwives represented in this study reported higher levels of emotional exhaustion, but also higher levels of personal accomplishment and lower levels of depersonalization compared to other global reports in this context. A further recent comparative systematic review (Rizzo et al., 2023) examined burnout scores among nurses before and after COVID-19. Surprisingly, the results from their review did not identify any statistically significant differences in burnout scores before and after the pandemic. One explanation to account for our findings might be that the Australian nursing and midwifery workforce did not experience the high numbers of COVID-19 infections when compared to our colleagues globally. However, our study sample experienced some of the harshest lockdowns in the world (Smith, 2020) leading to distress related to enforcement of strict policies of visiting restrictions, which separated families experiencing dying or birthing, in order to minimize infectious risk (Corbett et al., 2020; Doherty & O'Brien, 2023; Jackson et al., 2023). Nurses and midwives also reported that participation in hospital affairs, contributions to foundations for quality care and perceptions of the nurse/midwife managers ability, leadership and support of nurses/midwives were also significant independent predictors of emotional exhaustion.

Noteworthy, a sense of coherence was a significant protective factor for mental health well-being for the participants, which is to say, high levels of coherence were predictive of low levels of anxiety, depression and burnout in this study sample. Our findings are similar to other published work, supporting the development of a sense of coherence as a worthy area for future interventional research (Pachi et al., 2022; Stoyanova & Stoyanov, 2021). A sense of coherence has been reported to be a mediator between mood and empathy among healthcare professionals (Hori et al., 2022) and should be considered as a key element to consider in building resilience in nurses and midwives, for their own well-being.



TABLE 3 Results from moderation analyses predicting symptoms of anxiety, depression and burnout from stress and workplace supports.

Variables	<i>b</i>	SE	<i>t</i>	<i>p</i>	CI <sub>s</sub>
<b>Outcome: Anxiety</b>					
Coherence	-0.170	0.024	-7.227	< .001	-0.216, -0.124
Nurse Participation in Hospital Affairs	0.499	0.500	0.998	.320	-0.489, 1.487
Coherence × Nurse Participation	-0.058	0.040	-1.454	.148	-0.137, 0.021
$R^2 = .26, F(3,152) = 17.86, p < .001$					
Coherence	-0.163	0.024	-6.820	< .001	-0.210, -0.116
Nursing Foundations for Quality Care	0.167	0.586	0.285	.776	-0.989, 1.322
Coherence × Nursing Foundations	-0.033	0.045	-0.733	.465	-0.121, 0.056
$R^2 = .25, F(3,152) = 16.78, p < .001$					
Coherence	-0.159	0.024	-6.612	< .001	-0.206, -0.111
Nurse Manager Ability, Leadership and Support	-0.131	0.449	-0.291	.771	-1.018, 0.756
Coherence × Nurse Manager Ability	0.007	0.033	-0.204	.839	0.059, 0.072
$R^2 = .25, F(3,152) = 16.58, p < .001$					
Coherence	-0.158	0.024	-6.626	< .001	-0.205, -0.111
Staffing and Resource Adequacy	-0.376	0.462	-0.814	.417	-1.288, 0.536
Coherence × Staffing and Resource Adequacy	-0.046	0.035	-1.339	.183	-0.114, 0.022
$R^2 = .26, F(3,152) = 17.46, p < .001$					
Coherence	-0.158	0.023	-6.688	< .001	-0.203, -0.112
Collegial Nurse-Physician Relations	-0.080	0.530	0.151	.880	-1.127, 0.967
Coherence × Collegial Relations	-0.080	0.041	-1.954	.056	-0.161, 0.001
$R^2 = .26, F(3,152) = 18.22, p < .001$					
<b>Outcome: Depression</b>					
Coherence	-0.202	0.021	-9.841	< .001	-0.242, -0.161
Nurse Participation in Hospital Affairs	-0.296	0.436	-0.678	.499	-1.158, 0.566
Coherence × Nurse Participation	0.001	0.035	0.033	.974	-0.068, 0.070
$R^2 = .42, F(3,152) = 36.00, p < .001$					
Coherence	-0.198	0.021	-9.628	< .001	-0.239, -0.157
Nursing Foundations for Quality Care	-0.663	0.504	-1.315	.191	-1.659, 0.333
Coherence × Nursing Foundations	0.008	0.039	0.215	.830	-0.068, 0.084
$R^2 = .42, F(3,152) = 36.75, p < .001$					
Coherence	-0.195	0.021	-9.523	< .001	-0.235, -0.154
Nurse Manager Ability, Leadership and Support	-0.467	0.382	-1.221	.224	-1.222, 0.288
Coherence × Nurse Manager Ability	0.045	0.028	1.581	.116	-0.011, 0.101
$R^2 = .43, F(3,152) = 38.56, p < .001$					
Coherence	-0.197	0.021	-9.582	< .001	-0.238, -0.156
Staffing and Resource Adequacy	-0.497	0.399	-1.246	.215	-1.285, 0.291
Coherence × Staffing and Resource Adequacy	0.024	0.030	0.805	.422	-0.035, 0.083
$R^2 = .42, F(3,152) = 37.20, p < .001$					
Coherence	-0.203	0.020	-10.118	< .001	-0.243, -0.163
Collegial Nurse-Physician Relations	-0.285	0.463	-0.616	.539	-1.200, 0.630
Coherence × Collegial Relations	-0.018	0.036	-0.504	.615	-0.089, 0.053
$R^2 = .42, F(3,152) = 36.10, p < .001$					
<b>Outcome: Burnout (Emotional Exhaustion)</b>					
Coherence	-0.558	0.067	-8.337	< .001	-0.690, -0.426
Nurse Participation in Hospital Affairs	-4.071	1.423	-2.861	.005	-6.882, -1.260

(Continues)



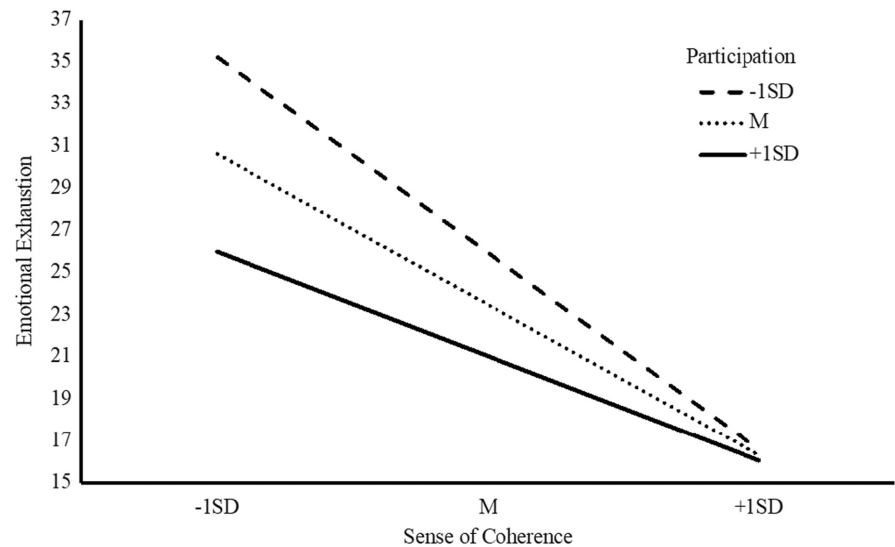
TABLE 3 (Continued)

Variables	b	SE	t	p	CI <sub>s</sub>
Coherence × Nurse Participation	0.284	0.114	2.505	.013	0.060, 0.508
	$R^2 = .41, F(3,152) = 35.28, p < .001$				
Coherence	-0.576	0.069	-8.382	< .001	-0.711, -0.440
Nursing Foundations for Quality Care	-4.084	1.684	-2.426	.016	-7.411, -0.758
Coherence × Nursing Foundations	0.198	0.129	1.540	.126	-0.056, 0.453
	$R^2 = .39, F(3,152) = 31.93, p < .001$				
Coherence	-0.564	0.068	-8.335	< .001	-0.697, -0.430
Nurse Manager Ability, Leadership and Support	-2.272	1.264	-1.797	.074	-4.769, 0.225
Coherence × Nurse Manager Ability	0.272	0.093	2.915	.004	0.088, 0.457
	$R^2 = .41, F(3,152) = 35.44, p < .001$				
Coherence	-0.527	0.065	-8.097	< .001	-0.656, -0.399
Staffing and Resource Adequacy	-5.573	1.263	-4.412	< .001	-8.069, -3.076
Coherence × Staffing and Resource Adequacy	0.181	0.094	1.918	.057	-0.005, 0.368
	$R^2 = .45, F(3,152) = 41.66, p < .001$				
Coherence	-0.621	0.068	-9.134	< .001	-0.755, -0.486
Collegial Nurse-Physician Relations	-0.687	1.570	-0.438	.662	-3.788, 2.414
Coherence × Collegial Relations	0.163	0.122	1.339	.182	-0.078, 0.404
	$R^2 = .36, F(3, 152) = 29.01, p < .001$				
<b>Outcome: Burnout (Depersonalization)</b>					
Coherence	-0.187	0.030	-6.248	< .001	-0.246, -0.128
Nurse Participation in Hospital Affairs	0.407	0.637	0.639	.524	-0.852, 1.666
Coherence × Nurse Participation	0.058	0.051	1.141	.256	-0.042, 0.158
	$R^2 = .22, F(3,152) = 14.28, p < .001$				
Coherence	-0.182	0.030	-6.033	< .001	-0.242, -0.123
Nursing Foundations for Quality Care	-0.377	0.740	-0.510	.611	-1.840, 1.085
Coherence × Nursing Foundations	0.059	0.057	1.037	.302	-0.053, 0.171
	$R^2 = .22, F(3,152) = 14.05, p < .001$				
Coherence	-0.195	0.030	-6.501	< .001	-0.254, -0.136
Nurse Manager Ability, Leadership and Support	0.904	0.561	1.611	.109	-0.204, 2.012
Coherence × Nurse Manager Ability	0.075	0.041	1.800	.074	-0.007, 0.157
	$R^2 = .24, F(3,152) = 15.59, p < .001$				
Coherence	-0.175	0.030	-5.806	< .001	-0.234, -0.115
Staffing and Resource Adequacy	-0.549	0.584	-0.941	.348	-1.702, 0.604
Coherence × Staffing and Resource Adequacy	0.059	0.044	1.359	.176	-0.027, 0.145
	$R^2 = .23, F(3,152) = 14.88, p < .001$				
Coherence	-0.195	0.029	-6.726	< .001	-0.253, -0.138
Collegial Nurse-Physician Relations	1.272	0.671	1.897	.060	-0.053, 2.597
Coherence × Collegial Relations	0.050	0.052	0.968	.335	-0.052, 0.153
	$R^2 = .23, F(3,152) = 15.47, p < .001$				
<b>Outcome: Burnout (Personal Accomplishment)</b>					
Coherence	0.286	0.037	7.670	< .001	0.213, 0.360
Nurse Participation in Hospital Affairs	0.402	0.794	0.507	.613	-1.166, 1.970
Coherence × Nurse Participation	0.097	0.063	1.538	.126	-0.028, 0.222
	$R^2 = .30, F(3,152) = 21.93, p < .001$				
Coherence	0.274	0.038	7.259	< .001	0.199, 0.348

TABLE 3 (Continued)

Variables	<i>b</i>	SE	<i>t</i>	<i>p</i>	CIs
Nursing Foundations for Quality Care	1.047	0.924	1.134	.259	-0.778, 2.873
Coherence × Nursing Foundations	0.033	0.071	0.473	.637	-0.106, 0.173
$R^2 = .30, F(3,152) = 21.44, p < .001$					
Coherence	0.275	0.038	7.254	< .001	0.200, 0.350
Nurse Manager Ability, Leadership and Support	0.849	0.708	1.199	.233	-0.550, 2.248
Coherence × Nurse Manager Ability	0.036	0.052	0.696	.488	-0.067, 0.140
$R^2 = .30, F(3,152) = 21.46, p < .001$					
Coherence	0.269	0.038	7.161	< .001	0.195, 0.344
Staffing and Resource Adequacy	1.197	0.730	1.640	.103	-0.245, 2.634
Coherence × Staffing and Resource Adequacy	0.031	0.055	0.565	.573	-0.077, 0.139
$R^2 = .30, F(3,152) = 21.99, p < .001$					
Coherence	0.281	0.038	7.654	< .001	0.208, 0.653
Collegial Nurse-Physician Relations	0.499	0.847	0.589	.557	-1.174, 2.171
Coherence × Collegial Relations	0.065	0.066	0.992	0.322	-0.065, 0.195
$R^2 = .30, F(3,152) = 21.31, p < .001$					

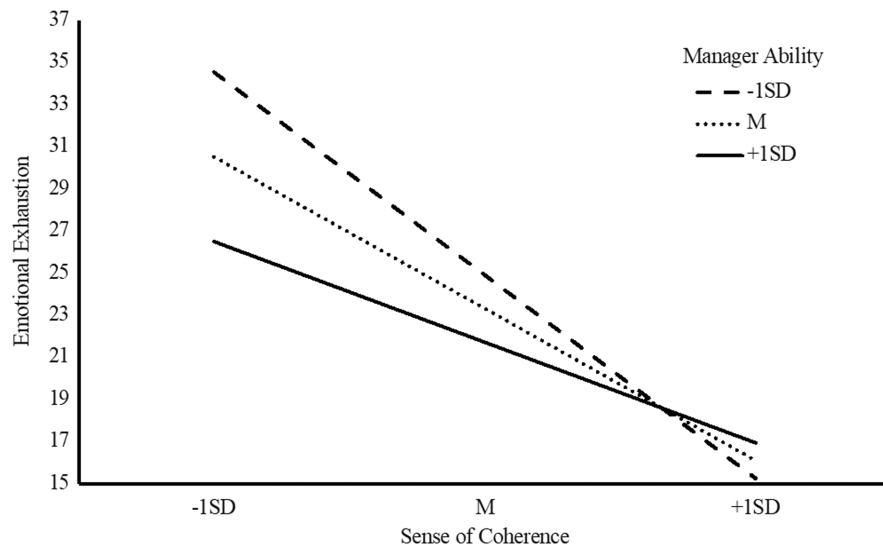
**FIGURE 2** Simple Slopes of Coherence × Nurse Participation in Hospital Affairs interaction on emotional exhaustion.



Other important key findings were that when nurses and midwives reported low levels of a sense of coherence, they reported high levels of emotional exhaustion when their hospital participation was low; however, when nurses and midwives reported a high level of a sense of coherence, there were no differences in participation or emotional exhaustion. Similarly, at low levels of a sense of coherence, they reported high levels of emotional exhaustion when the nurse/midwives managers ability, leadership and support of nurses and midwives were perceived as low. In contrast, at high levels of a sense of coherence there were minimal differences in the effects of nurse/midwives managers ability, leadership and support of nurses/midwives and evidence of emotional exhaustion. The proposed theory based on the JD-R model (Demerouti et al., 2001; Jourdain & Chênevert, 2010) was supported by this study's results relating to the effects of reported levels of hospital participation and the nurse/midwives managers ability, leadership and support of nurses/midwives. These findings suggest

that when nurses and midwives had a low level of sense of coherence during the COVID-19 pandemic they experienced emotional exhaustion when they had low levels of hospital participation and low levels of their perception of nurse/midwives managers ability, leadership and support of nurses and midwives.

Ensuring individualized tailored support will require a layered response within organizations aimed at individual self-care and collegial peer support. Equally, health organizations that support involvement and sense of belonging to the organization, and shared purpose (Vaandrager & Koelen, 2013), can be supportive of a sense of coherence, which can have a protective effect on individual staff. A recent publication has identified that evidence-informed interventions for nursing and midwifery professions remain in its infancy (Maben & Bridges, 2020); however, interventions point towards team support, peer support and support for leaders and managers is important.



**FIGURE 3** Simple Slopes of Coherence  $\times$  Nurse Manager Ability, Leadership and Support on emotional exhaustion.

#### 4.1 | Limitations

Due to the cross-section design of this study, no causal relationships can be made. Furthermore, the use of convenience sampling may have yielded unrepresentative results because of selection bias. Although this study involved self-report, caution should be taken in the risk of response bias. All of these considerations limit the generalizability of the results. Finally, the stressor (the COVID-19 pandemic) occurred before an initial baseline assessment of workplace conditions, meaning it cannot be concluded with certainty that the pandemic was the cause of the impact on mental health well-being.

## 5 | CONCLUSION

To our knowledge, this is the first study to investigate the propositions using the JD-R model for main/moderation/mediation effects of coherence and practice environment support on mental well-being (anxiety, depression and burnout) outcomes solely in nurses and midwives. Coherence was found to be a protective factor to mitigate the consequences of anxiety, depression and burnout. However, workplace policies and practices are required to promote the development of a sense of coherence to mitigate nurses' and midwives' negative impacts on mental health during the COVID-19 pandemic.

#### AUTHOR CONTRIBUTIONS

**C. Paterson:** Conceptualization, Methodology, Validation, Data Collection, Interpretation, Writing – Reviewing, Supervision, Funding Application. **D. Davis:** Methodology, Data Collection, Interpretation, Writing – Reviewing. **C. Roberts:** Methodology, Data Collection, Interpretation, Writing – Reviewing. **K. Bail:** Methodology, Data Collection, Interpretation, Writing – Reviewing. **E. Wallis:** Methodology, Data Collection, Interpretation, Writing – Reviewing. **H. L. Northam:** Methodology, Data Collection, Interpretation,

Writing – Reviewing. **J. Frost:** Methodology, Data Collection, Interpretation, Writing – Reviewing. **N. Jojo:** Methodology, Data Collection, Interpretation, Writing – reviewing. **C. McGrory:** Methodology, Data Collection, Interpretation, Writing – Reviewing. **A. Dombkins:** Funding, Writing – Reviewing. **P. S. Kavanagh:** Statistical analysis, Interpretation, Writing – Reviewing.

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#### CONFLICT OF INTEREST STATEMENT

None to declare.

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#### DATA AVAILABILITY STATEMENT

Research data are not shared due to ethical clearance approvals.

#### ETHICS STATEMENT

ACT REC: 2020.ETH.00121.

#### CONSENT TO PARTICIPATE

Written informed consent.

#### CONSENT FOR PUBLICATION

Not applicable.

#### CODE AVAILABILITY

Not applicable.

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## SUPPORTING INFORMATION

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

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Supplementary Table 1

## STROBE Statement—Checklist of items that should be included in reports of cross-sectional studies

	<b>Item No</b>	<b>Recommendation</b>	<b>Page No</b>
<b>Title and abstract</b>	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
<b>Introduction</b>			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-6
Objectives	3	State specific objectives, including any prespecified hypotheses	6-7
<b>Methods</b>			
Study design	4	Present key elements of study design early in the paper	7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	7
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	8-11
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	8-11
Bias	9	Describe any efforts to address potential sources of bias	11
Study size	10	Explain how the study size was arrived at	11
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	11-14
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	11-12
		(b) Describe any methods used to examine subgroups and interactions	11-12
		(c) Explain how missing data were addressed	12
		(d) If applicable, describe analytical methods taking account of sampling strategy	11-12
		(e) Describe any sensitivity analyses	N/A
<b>Results</b>			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7
		(b) Give reasons for non-participation at each stage	N/A
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7
		(b) Indicate number of participants with missing data for each variable of interest	12



Outcome data	15*	Report numbers of outcome events or summary measures	12-14
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Tables, Figures
		(b) Report category boundaries when continuous variables were categorized	N/A
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
<b>Discussion</b>			
Key results	18	Summarise key results with reference to study objectives	15-17
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	17
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	15-17
Generalisability	21	Discuss the generalisability (external validity) of the study results	17
<b>Other information</b>			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Title page