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Australian and Danish nurses' and midwives' wellbeing during COVID-19: A comparison study

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ABSTRACT

Background: Most investigations of nurses' and midwives' psychological wellbeing during the COVID-19 pandemic have been conducted in a single setting.

Aim: To assess and compare the psychological wellbeing of nurses and midwives in Australia and Denmark during the COVID-19 pandemic.

Methods: Nurses and midwives employed at four metropolitan health services in Australia and one in Denmark completed an anonymous online survey, which assessed depression, anxiety, and stress symptoms (The Depression, Anxiety and Stress Scale - 21 Items (DASS-21)), and sociodemographic and employment factors.

Findings: Completed surveys were received from 3001 nurses and midwives (1611 Australian and 1390 Danish). Overall, approximately one in seven of the nurses and midwives surveyed reported moderate to extremely severe levels of depression ($n = 399$, 13.5%), anxiety ($n = 381$, 12.9%) and stress ($n = 394$, 13.4%). Australian nurses' and midwives' scores on all DASS-21 subscales were significantly higher (representing higher levels of depression, anxiety and stress) than the scores for the Danish nurses and midwives. Fewer years of clinical experience, living in Australia and being employed on a part-time basis were significantly associated with higher levels of psychological distress.

Discussion: A considerable proportion of nurses and midwives experienced distress during the COVID-19 pandemic; however, the proportion and severity varied by country. Australian nurses and midwives experienced higher levels of distress than their Danish colleagues.

Conclusion: Nurses and midwives working in countries with relatively low numbers of COVID-19 cases and deaths are also likely to experience psychological distress. Nurses and midwives would benefit from targeted country-specific support and wellbeing initiatives.

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Summary of relevance

Problem

Most investigations of nurses' and midwives' psychological wellbeing during the COVID-19 pandemic have been conducted in single settings; little is known about inter-country variations.

Already known

Nurses and midwives have experienced more psychological distress during the pandemic than other health care workers.

What this paper adds

A considerable proportion of nurses and midwives have experienced distress; however, the proportion and severity vary by country. Nurses and midwives working in countries with relatively low numbers of COVID-19 cases and deaths are also likely to experience psychological distress. Nurses and midwives would benefit from targeted country-specific support and wellbeing initiatives.

1. Introduction

Studies investigating the psychological wellbeing of nurses and midwives during the COVID-19 pandemic have mostly been conducted in single settings (Lai et al., 2020; Sampaio et al., 2020). A recent systematic review about the prevalence of psychological distress among nurses during the pandemic identified very few studies that had been conducted in more than one setting; only two of the 93 included studies were conducted in more than one country and none of these were high-income countries (Al Maqbali et al., 2021). While these single country studies provide important insights into a particular setting, international comparisons allow for exploration of nurses' and midwives' experiences in different contexts which can provide important evidence about the impact of the COVID-19 pandemic on nurses and midwives more broadly and assist to inform initiatives to support nurses' and midwives' psychological wellbeing during a pandemic or other infectious disease outbreaks.

2. Literature review

Evidence from a range of countries including China (Chen et al., 2020), India (Chew et al., 2020), Portugal (Sampaio et al., 2020), Singapore (Tan et al., 2020) and the United Kingdom (Royal College of Nursing Research Society steering group, 2020) has demonstrated the immediate psychosocial impact of the COVID-19 pandemic on health care workers. To date, the emerging evidence suggests that nurses and midwives have experienced poorer psychological wellbeing during the pandemic than other health care workers (De Kock et al., 2021; Holton et al., 2020; Lai et al., 2020). A recent Australian study of hospital clinical staff found that nurses and midwives reported more severe symptoms of anxiety than doctors and allied health staff (Holton et al., 2020). Nurses in China have also reported more severe mental health symptoms than other health care workers (Lai et al., 2020); and a rapid review of mental health outcomes amongst health care workers during the COVID-19 pandemic concluded that nurses may be at higher risk of adverse mental health outcomes than other health care workers (De Kock et al., 2021). Certain sociodemographic and occupational factors such as age, sex, and years of clinical experience appear to be associated with emotional distress among health care workers during the COVID-19 pandemic (De Kock et al., 2021; Holton et al., 2020; Lai et al., 2020). Nevertheless, there has been limited investigation of these factors among nurses and midwives.

Countries around the world have experienced variation in numbers of COVID-19 cases and deaths and responded in different

ways to slow the spread of the virus and 'flatten the curve'. Some countries such as Sweden initially implemented fewer and less stringent restrictions; for example, schools remained open, and borders with other European countries did not close (Duckett & Mackey, 2020). On the other hand, countries such as Australia and Denmark introduced several initiatives to ease the potential impact on health services, including 'social' (physical) distancing and the closure of nonessential services, schools, and international borders (ABC News, 2020b; Ging, 2020; Olganier & Mogensen, 2020).

Australia and Denmark, both high-income countries with relatively small populations, few or no borders with other countries and mostly publicly funded health care systems, have recorded lower numbers of COVID-19 cases and deaths in comparison to other countries (countryeconomy, 2021; Olganier & Mogensen, 2020). As of mid-May 2020, the cumulative confirmed COVID-19 deaths per million people in Australia was 3.84 and in Denmark 92.71 compared to 274.18 in the United States (US), 361.02 in Sweden, and 492.33 in the United Kingdom (UK); and the cumulative confirmed COVID-19 cases per million people in Australia was 275.88 and 1987.21 in Denmark compared to 2980.71 in Sweden, 3348.76 in the UK and 4396.33 in the US (Roser et al., 2020a, 2020b).

The psychological wellbeing of nurses and midwives working in Australia and Denmark during the COVID-19 pandemic and the factors which may be associated with poorer wellbeing are not well understood. It is also not known whether nurses and midwives in these two countries experienced similar or different levels of psychological wellbeing.

This study aimed to assess the psychological wellbeing of nurses and midwives in Australia and Denmark during the COVID-19 pandemic. The study had four objectives: (i) To assess nurses' and midwives' levels of depression, anxiety and stress; (ii) To identify the number of nurses and midwives in the mild, moderate, severe and extremely severe diagnostic categories for depression, anxiety and stress; (iii) To evaluate variables significantly associated with greater levels of depression, anxiety and stress; and (iv) To identify differences in levels of depression, anxiety and stress between Australian and Danish nurses and midwives.

3. Methods

3.1. Study design

A brief self-administered anonymous online cross-sectional survey was administered to nurses and midwives employed at the participating health services during the study period (seven weeks from mid-May to early August 2020).

3.2. Recruitment and study setting

Nurses and midwives were recruited from four health services in the state of Victoria, Australia and one health service in Denmark. The Australian health services are all located in metropolitan Melbourne, Victoria; three are public health services which provide acute tertiary services, subacute care, specialist clinics and community health services (Western Health, 2021; Monash Health, 2021; Eastern Health, 2021). The other Victorian health service is a private not-for-profit health service which provides acute medical, surgical and rehabilitation services (Epworth Healthcare, 2021). All the Victorian health services are university affiliated and located in different metropolitan regions of Melbourne; the three public health services provide care for more than half of Melbourne's population. Danish nurses and midwives were recruited from a large university hospital in Denmark, which is located in the Region of Southern Denmark and with all medical specialities represented and provides specialised treatment to citizens across the

region (Odense University Hospital, 2021). The participating public health services provided care and treatment for COVID-19 patients and established specific COVID-19 wards.

When the study commenced, COVID-19 restrictions were in place in Victoria (Australia) and Denmark which included caps on public and private gatherings (both indoors and outdoors), remote learning for school children and remote working for non-essential workers (ABC News, 2020b; Department of Health and Human Services, 2020) (Reuters, 2020). Health services in both Australia and Denmark had implemented several measures in order to protect their employees while providing best care for patients, including infection control measures, such as the use of personal protective equipment (PPE), visitor restrictions, the implementation of telehealth services for outpatient clinics, and a reduction in non-urgent face-to-face appointments (Sundhedsstyrelsen, 2020; Western Health, 2020).

There are approximately 22,740 nurses and midwives employed at the four Victorian health services and approximately 3,740 at the Danish health service: a total of approximately 26,480. The standard normal approximation gives a required sample size of 378 (Australia) and 349 (Denmark) ($d = 0.5$, $\alpha = 0.05$, 95% power).

3.3. Procedure

Nurses and midwives were sent an email invitation (via their health service's nursing and midwifery group email address) to complete the online survey (hosted on Qualtrics in Australia and REDCap in Denmark). The invitation included the link to the survey and a plain language statement; completion of the survey was taken as informed consent. Surveys were anonymous so all data were non-identifiable. The survey was open for approximately four weeks at each health service during the seven-week study period (mid-May to early August 2020). A reminder email was sent 2 to 3 weeks after the original invitation.

The Depression, Anxiety and Stress Scale - 21 Items (DASS-21), a widely used validated psychometric instrument (Lovibond & Lovibond, 1995), was used to measure respondents' psychological wellbeing in the previous week.

The survey used fixed-response questions and assessed:

- 1 To address objectives 1, 2 and 4, levels of depression, anxiety and stress: assessed using the DASS-21 (Lovibond & Lovibond, 1995). Scores on each of the subscales of DASS-21 range from 0 (no distress) to 21 (most distressed). Clinical cut-off points have been established for depression (mild, 5–6; moderate, 7–10; severe, 11–13; extremely severe, ≥ 14), anxiety (mild, 4–5; moderate, 6–7; severe, 8–9; extremely severe, ≥ 10) and stress (mild, 8–9; moderate, 10–12; severe, 13–16; extremely severe, ≥ 17) (Lovibond & Lovibond, 1995). The Cronbach's α was 0.899, 0.798 and 0.909. The DASS-21 was developed in Australia and has been validated for use in Denmark (Psychology Foundation of Australia, 2018).
- 2 To address Objective 2, respondents' employment and sociodemographic characteristics: sex, age, country of residence (Australia and/or Denmark), occupational role (nurse and/or midwife), living with school-aged children (yes and/or no), employment status (full time and/or part time), and years of clinical experience.

The same survey was used at each health service. The Danish version of the DASS-21 (Thastum, 2018) was included in the survey distributed to nurses and midwives in Denmark, and the remainder of the questions were translated from English into Danish using the principles of backward and forward translation by the Danish members of the research team (MR and MS) and the translation reviewed by BR; all are bilingual in English and Danish.

3.4. Data management and analysis

IBM SPSS Statistics version 26 (IBM Corp., Armonk, NY, USA) was used to analyse the data. DASS-21 subscale scores were calculated as outlined in the author guidelines (Lovibond & Lovibond, 1995) and are reported using descriptive statistics (Objective 1). In order to determine the proportion of nurses/midwives who had experienced 'normal', 'mild', 'moderate', 'severe' or 'extremely severe' levels of depression, anxiety or stress (Objective 2), the DASS-21 subscale data was analysed as instructed by the authors (Lovibond & Lovibond, 1995).

In accordance with the DASS-21 author guidelines (Lovibond & Lovibond, 1995), one missing item was permitted for each subscale of the DASS-21, and the mean of the remaining items was calculated for the relevant subscale. Cases with two or more missing values for each subscale were removed.

Associations between DASS-21 subscale scores and sociodemographic variables such as sex, country of residence (Australia and/or Denmark), having school-aged children living at home, age, years of clinical experience, employment status (full-time and/or part-time), and occupational role (nurse and/or midwife) were investigated (Objective 3). As the distribution of the DASS-21 subscale scores was significantly non-normal, Mann-Whitney U-tests, Kruskal-Wallis tests or Spearman's r coefficients were used as appropriate. For post hoc pairwise comparisons, significance values were adjusted by the Bonferroni correction for multiple tests.

Independent variables significantly associated with any of the subscale scores ($p < 0.05$) in univariate analysis were included in multiple regression models with DASS-21 subscale scores as the dependent variables. Preliminary analyses ensured that assumptions of multicollinearity were not violated (Tabachnik & Fidell, 2013).

Subscale scores were compared between the Danish and Australian cohorts (Objective 4) using the Mann-Whitney U test, as scores were not normally distributed. Means are presented for ease of interpretation.

3.5. Ethics approval

The human research ethics committees (HRECs) at each of the participating health services approved the study: Eastern Health HREC LR20/035, 5 May 2020; Epworth Healthcare HREC EH2020-558, 5 May 2020; Monash Health HREC RES-20-0000-297A, 29 May 2020; Western Health Low Risk Ethics Panel HREC/20/WH/62913, 5 May 2020; and the Danish Data Agency (20/19028).

4. Results

4.1. Sample and response

Approximately 26,480 nurses and midwives were employed by the participating health services, and 3,001 (11.3%) completed the survey. Of those nurses and midwives who completed a survey, just over half ($n = 1611$, 53.7%) were from Australia and the remainder from Denmark ($n = 1390$, 46.3%).

Most respondents were nurses and female, and over a third lived with school-aged children. Danish respondents were significantly more likely to be female, nurses, older, living with school-aged children, working full-time and had more years of clinical experience compared to the Australian respondents (Table 1).

4.2. Psychological wellbeing

Overall, approximately one in seven of the nurses and midwives surveyed reported moderate to extremely severe levels of

Table 1
Respondents' sociodemographic characteristics

Characteristic	Australian nurses/midwives (n = 1611)	Danish nurses/midwives (n = 1390)	Total sample (n = 3001)	p value
Female	1470 (93.0%)	1332 (95.8%)	2802 (93.4%)	p < 0.001
Age (years), Range (Mean)	21-70 (39.9)	23-74 (44.0)	21-74 (41.8)	p < 0.001
Live with school aged children	495 (31.3%)	549 (39.5%)	1044 (34.8%)	p < 0.001
Work full-time	433 (27.4%)	831 (59.8%)	1264 (42.1%)	p < 0.001
Years practised, Range (Mean)	0-51 (15.4)	0-49 (17.4)	0-51 (16.3)	p < 0.001
Occupational role (nurse)	1300 (86.2%)	1335 (96.0%)	2635 (87.8%)	p < 0.001

Table 2
Proportion of nurses and midwives scoring in the normal and clinical ranges of the DASS-21 subscales

Score ranges for clinical cut-off points (Lovibond & Lovibond, 1995)	n (%) scoring in each range		
	Australian nurses/midwives	Danish nurses/midwives	Total sample
Depression	n=1562	n=1390	n=2952
Normal (0-4)	1091 (69.8)	1266 (91.1)	2357 (79.8)
Mild (5-6)	147 (9.4)	49 (3.5)	196 (6.6)
Moderate (7-10)	204 (13.1)	42 (3.0)	246 (8.3)
Severe (11-13)	52 (3.3)	18 (1.3)	70 (2.4)
Extremely severe (≥14)	68 (4.4)	15 (1.1)	83 (2.8)
Anxiety^a	n=1560	n=1390	n=2950
Normal (0-3)	1040 (66.7)	1261 (90.7)	2301 (78.0)
Mild (4-5)	209 (13.4)	59 (4.2)	268 (9.1)
Moderate (6-7)	137 (8.8)	26 (1.9)	163 (5.5)
Severe (8-9)	81 (5.2)	19 (1.4)	100 (3.4)
Extremely severe (≥10)	93 (6.0)	25 (1.8)	118 (4.0)
Stress	n=1561	n=1390	n=2951
Normal (0-3)	1103 (70.7)	1230 (88.5)	2333 (79.1)
Mild (4-5)	166 (10.6)	58 (4.2)	224 (7.6)
Moderate (6-7)	136 (8.7)	48 (3.5)	184 (6.2)
Severe (8-9)	116 (7.4)	36 (2.6)	152 (5.2)
Extremely severe (≥10)	40 (2.6)	18 (1.3)	58 (2.0)

^a Total Ns are different to the N for the total sample (n = 3001) and Australian (n = 1611) and Danish (n = 3001) subsamples due to missing data.

Table 3
Respondents' scores on the DASS-21 subscales

DASS-21 Subscale	Australian nurses/midwives ^a	Danish nurses/midwives ^b	Total sample ^c	p value ^d
Depression	n=1562	n=1390	n=2952	
Mean (SD)	3.72 (4.15)	1.34 (2.69)	2.6 (3.73)	p < 0.001
Minimum	0.00	0.00	0.00	
Maximum	21.00	21.00	21.00	
Anxiety	n=1560	n=1390	n=2950	
Mean (SD)	3.14 (3.30)	1.17 (2.38)	2.2 (3.07)	p < 0.001
Minimum	0.00	0.00	0.00	
Maximum	19.00	21.00	21.00	
Stress	n=1561	n=1390	n=2951	
Mean (SD)	5.74 (4.58)	2.86 (3.84)	4.4 (4.48)	p < 0.001
Minimum	0.00	0.00	0.00	
Maximum	21.00	21.00	21.00	

^a Hegney et al (2014); N = 132

^b Tan et al (2020); N = 296

^c Sampaio et al (2020); N = 767

^d Total N's are different to the N for the total sample (n = 3001) and Australian (n = 1611) and Danish (n = 3001) subsamples due to missing data.

depression (n = 399, 13.5%), anxiety (n = 381, 12.9%) and stress (n = 394, 13.4%). However, a greater proportion of Australian nurses reported moderate to extremely severe levels of depression, anxiety and stress compared to the Danish nurses. Approximately one in five of the Australian nurses and midwives surveyed reported moderate to extremely severe levels of depression (n = 324, 20.8%), anxiety (n = 311, 20.0%) and stress (n = 292, 18.7%). In contrast, only about one in 20 of the Danish nurses and midwives reported moderate to extremely severe levels of depression (n = 75, 5.4%), anxiety (n = 70, 5.1%) and stress (n = 102, 7.4%) (Table 2).

The Australian nurses' and midwives' mean scores on all of the DASS-21 subscales were significantly higher than the mean scores for the Danish nurses and midwives (Table 3).

In univariate analysis, country of residence, having school-aged children living at home, employment status, age, occupational role and years of clinical experience were each significantly associated with at least one DASS-21 subscale scores. These variables were therefore included in the regression models, with one exception: Years of clinical experience was highly correlated with age (r = 0.889, p < 0.001); to avoid collinearity, years of clinical experience was included but age was not included in the multivariate analysis.

In the multiple regression models, fewer years of clinical experience and living in Australia were significantly associated with higher DASS-21 subscale scores (p < 0.001 for all). Not having school-aged children living at home was also significantly associated with higher DASS-21 subscale scores (p < 0.001 for all). Being

Table 4
Sociodemographic characteristics associated with DASS-21 subscale scores (multiple regression models)

Independent variables	Depression		Anxiety		Stress	
	Standardised coefficients Beta	Sig	Standardised coefficients Beta	Sig	Standardised coefficients Beta	Sig
Country (living in Australia)	0.290	p < 0.001	0.277	p < 0.001	0.288	p < 0.001
School-aged children (live with)	-0.083	p < 0.001	-0.079	p < 0.001	-0.062	p < 0.001
Employment status (work full-time)	-0.032	p = 0.088	-0.062	p < 0.001	-0.043	p = 0.019
Occupational role (nurse)	0.000	p = 0.987	-0.008	p = 0.657	-0.008	p = 0.670
Years of experience	-0.154	p < 0.001	-0.207	p < 0.001	-0.164	p < 0.001

employed on a part-time basis was significantly associated with higher DASS-21 Anxiety ($p < 0.001$) and Stress ($p = 0.019$) scores (Table 4).

5. Discussion

This study is one of the first to compare the immediate effects of the COVID-19 pandemic on the psychological wellbeing of nurses and midwives in two countries, Australia and Denmark. Both countries implemented similar social, economic, and educational restrictions in response to the pandemic (Briggs, 2020), and have experienced relatively lower numbers of COVID-19 cases and deaths than other high-income countries such as Sweden, the US and UK. The findings indicate that about one in seven of the nurses and midwives surveyed experienced psychological distress during the COVID-19 pandemic. However, nurses and midwives in Australia reported more severe levels of depression, anxiety and stress than those in Denmark. Less experienced nurses and midwives also reported significantly higher levels of depression, anxiety and stress than their colleagues with more years of clinical experience.

The study's findings are similar to those of others, which have also found that nurses and midwives have experienced depression, anxiety and stress symptoms during the COVID-19 pandemic (Hammond et al., 2020; Sampaio et al., 2020; Tan et al., 2020). Australian nurses and midwives, however, were significantly more likely than their counterparts in Denmark to experience symptoms of depression, anxiety and stress, and their mean scores on each of the DASS-21 subscales were significantly higher. The mean scores of Australian nurses and midwives are also higher than those reported in a study of Australian nurses before the COVID-19 pandemic (Hegney et al., 2014) (Depression: 3.72 vs 2.88; Anxiety: 3.14 vs 2.17; Stress: 5.75 vs 4.80; $p < 0.001$ for all), and a study of doctors and nurses in Singapore during the pandemic (Tan et al., 2020) (Depression: 3.72 vs 2.54; Anxiety: 3.14 vs 2.45; Stress: 5.75 vs 3.82; $p < 0.001$ for all).

These findings suggest that nurses and midwives working in different countries experienced varying levels of psychological distress during the COVID-19 pandemic. A study of European doctors and nurses also found that levels of distress varied between countries, with participants from France and the United Kingdom more likely to report severe or extremely severe levels of depression, anxiety and stress compared to those from the other European countries included in the study (Hummel et al., 2021).

Worry about becoming infected has been identified as a key stressor for health care workers in infectious disease outbreaks such as the COVID-19 pandemic as the risk of infection has implications not only for their own health but also for that of their families (Digby et al., 2020; Koh et al., 2005; Nie et al., 2020). Although there were a higher number of COVID-19 cases and deaths in Denmark at the time of the study than in Australia, it may be that Danish nurses and midwives perceived their risk of infection to be lower than that of health care workers in other European countries such as Sweden, Portugal, Italy and the UK which all had higher numbers of COVID-19 cases and deaths and experienced a

greater impact on their health care system. The Danish government was among the first countries in Europe to implement lockdown restrictions and close its borders as well as reopen them (Olagnier & Mogensen, 2020). Accordingly, nurses and midwives working in Denmark may have experienced less distress as they may have compared their situation to that in neighbouring countries and perceived it was not as severe. Danes also tend to have high levels of trust in their government and health authorities and consequently, the Danish nurses and midwives may have felt that the authorities had the pandemic under control (Ministry of Foreign Affairs of Denmark, 2021; Nielsen & Lindvall, 2021). The distress levels of nurses and midwives in Australia may have been exacerbated by media reports of potential exposure to and high transmission rates of COVID-19 among health care workers internationally (ABC News, 2020a; Morris, 2020).

Feelings of uncertainty have also been associated with high anxiety levels among healthcare workers during the COVID-19 pandemic (Şahin & Kulakaç, 2021). The different levels of distress experienced by the nurses and midwives in this study may also be related to their level of certainty about the impact of the pandemic and its progression in their respective countries. Uncertainty contributes to anxiety in that it diminishes how efficiently and effectively people can prepare for the future (Grupe & Nitschke, 2013). At the time of the study, Denmark had already experienced a higher number of COVID-19 cases and deaths than Australia and had been able to closely observe the experiences of their neighbouring European countries. Accordingly, the Danish nurses and midwives may have felt more certainty about how things would occur and what they would be like; whereas for many Australian nurses and midwives, this was not known as most were yet to experience caring for COVID-19 patients or other aspects of the pandemic and were relying on media reports for information.

Occupational factors such as years of clinical experience and employment status (full-time vs part-time) also contributed to the psychological wellbeing of nurses and midwives in this study. Similar to the findings of five studies included in a recent rapid systematic review about the factors associated with psychological distress in health care workers during an infectious disease outbreak (Sirois & Owens, 2021) and a study of UK nurses' work experiences during the COVID-19 pandemic (Roberts et al., 2021), the nurses and midwives surveyed in this study who had less years of clinical experience reported higher levels of depression, anxiety and stress than those with more years of experience. Nurses and midwives who have more years of clinical experience are likely to have greater clinical confidence and expertise and therefore, feel better equipped due to their knowledge and prior experiences to provide patient care during a pandemic (Roberts et al., 2021; Romero et al., 2020). It appears that this is protective of their wellbeing.

Working part-time was found to be associated with higher levels of psychological distress than full-time work in this study. Similarly, a study conducted during the SARS outbreak in Canada found that working part-time was a predictor of greater psychological distress for health care workers (Nickell et al., 2004). The study's authors suggested that part-time staff were more likely than full-

time staff to experience emotional distress as they had received less current information and had a reduced sense of involvement in the hospital's response to the SARS outbreak.

This study found that having school-aged children living at home was associated with better mental health (i.e. lower DASS-21 scores) despite the anticipated potential negative impacts of remote learning. Nevertheless, this finding is consistent with that of others. A recent US study found that having children at home was associated with a lower prevalence of anxiety and depression among health care workers during the COVID-19 pandemic (Evanoff et al., 2020). These findings may reflect respondents' levels of social connectedness and suggest (as others have found both prior to and during the pandemic) that living with others is protective against poor mental health (Dawel et al., 2020; Evanoff et al., 2020; Leigh-Hunt et al., 2017; Li & Wang, 2020; Palgi et al., 2020). Although this study did not investigate respondents' living arrangements (other than whether they had school-aged children living at home), it may be that those who did not have school-aged children were more likely to be living alone. Further, nurses and midwives have been regarded as 'essential workers' during the COVID-19 pandemic and children of essential workers have been permitted to attend (in-person) school (ABC News, 2020c). Therefore, it may be that the children of many of the respondents were at school and accordingly, the respondents did not experience many of the possible stressors of their children participating in remote learning.

5.1. Strengths and limitations

Although the study had a large sample size, the response rate was relatively low in the Australian health services. Nevertheless, the response rate is similar to that of other studies conducted during an infectious disease outbreak (Maunder et al., 2004); and it has been suggested that survey-based studies among healthcare workers have had lower response rates during the COVID-19 pandemic than prior to the pandemic (34.5% vs 51.0%, $p < 0.001$) (de Koning et al., 2021). It was also not possible to determine the number of nurses and midwives who received the email invitation to complete the survey. Thus, the response rate is a conservative estimate based on the number of nurses and midwives employed at the health services.

The study was conducted at five metropolitan health services in two high-income countries; however, the findings may not be generalisable to nurses and midwives working in smaller or rural health services or other settings.

This study examined nurses' and midwives' psychological wellbeing during the COVID-19 pandemic using the DASS-21 which assesses only symptoms of depression, anxiety, and stress. Future studies should explore other mental health disorders such as post-traumatic stress disorder, resilience, fatigue and burnout. It is possible that nurses' and midwives' emotional wellbeing was influenced by other factors not investigated in this study such as their perceptions of the quality and quantity of PPE available at their health service. Such factors should also be investigated in future studies.

This study was conducted at only one timepoint during the COVID-19 pandemic. It is likely that nurses' and midwives' experiences and wellbeing may change as the pandemic progresses. Longitudinal studies would provide important data about the long-term effects of the pandemic on nurses' and midwives' psychological wellbeing.

5.2. Implications for nursing/midwifery/health service policy and practice

The findings of this study suggest that although the COVID-19 pandemic has had a significant impact on the psychological wellbeing of nurses and midwives, the level of psychological distress varies by country. It cannot be assumed that nurses and midwives working in a country with a low number of COVID-19 cases and deaths will not experience psychological distress. Occupational factors also appear to be associated with psychological wellbeing; nurses and midwives with less clinical experience and those who work part-time experienced more distress. The findings of this study indicate that nurses and midwives would benefit from targeted country-specific support and wellbeing initiatives, particularly those with less clinical experience and those who work part-time. It may be beneficial during a pandemic to screen and assess nurses and midwives for symptoms of depression, anxiety and stress, and those who screen positive to mental health problems provided with appropriate referral pathways and support.

6. Conclusion

Nurses and midwives have experienced psychological distress during the COVID-19 pandemic; however, the proportion and severity vary by country. It appears that country-specific and occupational factors are associated with nurses' and midwives' psychological wellbeing, and nurses and midwives would benefit from targeted country-specific support and wellbeing initiatives, particularly those with less clinical experience and those who work part-time.

Conflicts of interest

None.

Authorship contribution statement

The paper properly credits the meaningful contributions of co-authors and co-researchers.

Ethical Statement

The submitted manuscript involved human research. The study was approved by the human research ethics committees (HRECs) of the participating health services: Eastern Health HREC LR20/035, 5 May 2020; Epworth Healthcare HREC EH2020-558, 5 May 2020; Monash Health HREC RES-20-0000-297A, 29 May 2020; Western Health Low Risk Ethics Panel HREC/20/WH/62913, 5 May 2020; and the Danish Data Agency (20/19028).

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