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# Depression, anxiety and stress among Australian nursing and midwifery undergraduate students during the COVID-19 pandemic: a cross-sectional study

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## Abstract

**Objectives:** To assess depression, anxiety and stress among undergraduate nursing and midwifery students during the COVID-19 pandemic, and identify socio-demographic and educational characteristics associated with higher depression, anxiety and stress scores.

**Methods:** Cross-sectional study during August–September 2020, using an anonymous, online, self-administered survey. E-mail invitations with a survey link were sent to 2,907 students enrolled in the Bachelor of Nursing suite of courses, offered across four campuses of a single university in Victoria, Australia. Depression, anxiety and stress were assessed using the DASS-21. Data on socio-demographic and educational characteristics, self-rated physical health and exposure to COVID-19 were also collected. DASS-21 subscale scores were compared with existing data for various pre-pandemic and COVID-19 samples. Multiple regression was used to investigate factors associated with higher scores on depression, anxiety and stress subscales.

**Results:** The response rate was 22% (n=638). Mean scores on all DASS-21 subscales were significantly higher ( $p < 0.001$ ) than means from all comparative sample data. The proportions of students reporting moderate to severe symptoms of depression, anxiety and stress were 48.5%, 37.2% and 40.2% respectively. Being a woman,

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being younger, having completed more years of study and having poorer self-rated general health were all significantly associated ( $p < 0.05$ ) with higher scores on at least one DASS-21 subscale.

**Conclusions:** Almost half of participants reported at least moderate symptoms of depression; more than a third reported at least moderate symptoms of anxiety or stress. Poor psychological wellbeing can impact students' successful completion of their studies and therefore, has implications for nursing and midwifery workforce recruitment and retention. During and after pandemics, universities should consider screening undergraduate students not only for anxiety and stress, but also for depression. Clear, low-cost referral pathways should be available, should screening indicate that further diagnosis or treatment is required.

**Keywords:** anxiety; COVID-19; depression; nursing and midwifery students; psychological stress.

## Introduction

Internationally, the outbreak of novel coronavirus 2019 (COVID-19) has impacted negatively on the mental health of the general population (Xiong et al., 2020) and healthcare workers (Chew et al., 2020a, 2020b; Holton et al., 2020; Segers, 2020). In March 2020, the World Health Organization (WHO) released a statement indicating international concern about responding to the mental health and psychosocial impacts of the pandemic, including potential effects on healthcare workers (World Health Organization, 2020a). Nurses and midwives are the largest workforce in health services and their direct and sustained patient contact makes them more vulnerable to exposure and risk of COVID-19 infection than other occupational groups. Negative impacts on nurses' and midwives' psychological wellbeing have been reported (Holton et al., 2020; Joo & Liu, 2021; Ruiz-Fernandez et al., 2020).

Before the COVID-19 pandemic, a meta-analysis reported the prevalence of depression among nursing students to be 34.0% (95% CI 28.0–40.0%) (Tung, Lo, Ho, & Tam, 2018). However, similarly rigorous estimates of anxiety and stress have not been reported. Undergraduate students reported anxiety and stress during the COVID-19 pandemic (Baloran, 2020; Cao et al., 2020). University students experienced a rapid transition from face-to-face to an online or more flexible learning environment during university 'lock downs'. Nursing and midwifery students, too, faced challenges in adjusting to 'distance learning' as undergraduate nursing and midwifery curricula were rapidly transitioned to online delivery (Masha'al, Rababa, & Shahrour, 2020). In addition, changes implemented in health service delivery had considerable impacts on availability of clinical placements for nursing and midwifery students, and students may have experienced concerns about potentially caring for patients with confirmed or suspected COVID-19 during placements at health services (Swift et al., 2020).

Few studies have used validated tools to assess psychological distress among nursing and midwifery students during the COVID-19 or other pandemics. During the Severe Acute Respiratory Syndrome (SARS) pandemic, one study investigated stress among undergraduate nursing students using the Perceived Stress Scale (Wong et al., 2004). Nursing students' stress scores were higher than medical students' scores, but not significantly higher than non-healthcare students (Wong et al., 2004). During the COVID-19 pandemic, the prevalence of moderate and severe anxiety among nursing students in Israel as measured by the Generalized Anxiety Disorder Seven-Item Scale was 42.8% and 18.1%, respectively (Savitsky, Findling, Erel, & Hendel, 2020). Among nursing students in India, stress scores on the Perceived Stress Scale were higher among students with less knowledge of epidemic prevention and treatment and those living in rural than urban areas (Zhi et al., 2020). Australian nursing students reported significantly higher scores on the Six-Item State-trait Anxiety Inventory (STAI) than Indian nursing students (Kochuvilayil et al., 2021). No studies have assessed depression, anxiety and stress among undergraduate nursing and midwifery students, using validated measures for all three constructs.

## Aims and objectives

The aims of this study were to: 1) assess depression, anxiety and stress among undergraduate nursing and midwifery students at one of the largest schools of nursing and midwifery in Australia during the COVID-19 pandemic and 2) identify socio-demographic and educational characteristics associated with higher depression, anxiety and stress scores.

## Methods

### Study design

This was a cross-sectional study using a self-administered, anonymous, online survey.

### Setting

This study was undertaken at a university in Victoria, Australia, which has four campuses encompassing metropolitan Melbourne, regional and rural areas. The three-year full-time degrees offered are the Bachelor of Nursing (BN) and the BN (Clinical Leadership). Four-year full-time degrees are the BN/Bachelor of Midwifery, BN/Bachelor of Psychological Sciences, and BN/Public Health and Health Promotion.

Students commenced face-to-face theoretical and simulated learning on 9 March 2020. Two weeks later, the Victorian State Government introduced 'Stage 4' restrictions as a measure to reduce the spread of the COVID-19 pandemic and potential impacts on health services (Victorian Department of Health and Human Services, 2021). Measures included mandatory physical distancing; substantial changes at government-operated health services; and closure of non-essential services including universities and schools (Victorian Department of Health and Human Services, 2021). These restrictions mandated that delivery of higher education be undertaken online. Face-to-face theory classes at the study university therefore transitioned to online seminars. However, nursing and midwifery education at the study university was provided with a special exemption to continue practical simulation classes for nursing and midwifery students throughout the Stage 4 restriction period in Victoria. These special arrangements enabled students to participate in key simulation learning activities to facilitate student preparedness and patient safety when undertaking placements. The face-to-face simulation classes were modified to meet state government physical distancing requirements, by reducing simulation class student numbers, maintenance of physical distancing (at least 1.5 m between individuals) and wearing of masks (McDonall, McTier, & Phillips, 2020).

On the day the survey was launched, 18 August 2020, Victoria had recorded 17,238 cases of COVID-19, including 211 new cases and 17 deaths overnight (most in metropolitan Melbourne) (Australian Government Department of Health, 2020). Compared to many other countries, this represents a relatively low number of cases and deaths due to COVID-19.

### Sample

All undergraduate nursing and midwifery students enrolled in any of the BN programs across the four campuses at the study university were invited to participate.

### Instruments

The survey included mostly fixed-response questions and assessed three domains: 1) socio-demographic, educational and employment characteristics (see Table 1), 2) physical and psychological health and 3) perceived impact of COVID-19 on educational progress and preparedness for clinical placement. This paper focuses on the first two domains; outcomes related to the third domain are not reported here.

Three dimensions of physical and psychological health were examined: psychological distress (depression, anxiety and stress); COVID-19 exposure and general health status.

Psychological distress (depression, anxiety and stress symptoms during the past week) was assessed using the 21-item Depression, Anxiety and Stress Scales (DASS-21) (Lovibond and Lovibond 1995). Scores on each subscale range from 0 (no distress) to 21 (most distressed). Clinical cut-off points for each subscale have been established (see Table 2) (Lovibond and Lovibond 1995). During the COVID-19 pandemic, the DASS-21 has been used to assess depression, anxiety and stress in the general public and

healthcare workers (Tan et al., 2020; Tee et al., 2021; Wang et al., 2021). In this study, Cronbach's  $\alpha$  was 0.912 for the Depression subscale, 0.814 for the Anxiety subscale and 0.889 for the Stress subscale.

Regarding COVID-19 exposure, students were asked whether they had no previous contact with people with known COVID-19 diagnosis, whether they had contact resulting in a period of self-isolation or whether they had a previous or current COVID-19 diagnosis.

General health status was examined using a single global measure: 'In general, would you say your health is: excellent, very good, good, fair, or poor?' (Australian Bureau of Statistics, 2018).

### **Ethical considerations**

The study involved negligible risk to participants. Information about support services available to students was included at the end of the survey for respondents who may have experienced discomfort while completing the survey. The study was approved by the University's Human Research Ethics Committee (Deakin University Human Ethics Advisory Group – Health 164\_2020).

### **Data collection**

The anonymous online survey was hosted on Qualtrics (Qualtrics, 2020), for a four week period (18 August 2020–15 September 2020). A university representative (not a research team member) sent an e-mail invitation (including links to survey and plain language statement) to eligible students, followed by a reminder two weeks later. Completion of a survey indicated consent. The survey was designed to take less than 20 min to complete.

### **Data analysis**

Data were analyzed using IBM SPSS Statistics version 26. DASS-21 subscale scores and proportion scoring in clinical ranges were calculated as outlined by the instrument's authors (Lovibond and Lovibond 1995) to determine the proportion of students who experienced 'normal', 'mild', 'moderate', 'severe' or 'extremely severe' depression, anxiety or stress. These 'labels' assisted in characterizing distress severity relative to the general population. Using one-sample t-tests, the subscale scores were compared to DASS-21 scores reported for (a) healthy adults (all ages) in Australia (Crawford et al., 2011); (b) healthy adults (18–24) in Australia (Crawford et al., 2011); (c) a sample of more than 5,000 students enrolled in a different Melbourne university in 2013 (Larcombe et al., 2014); (d) a sample of nurses and midwives working in a Melbourne hospital during the COVID-19 pandemic (May–June 2020) (Holton et al., 2020) and (e) a sample of Australian young adults (18–24) with no mental health diagnoses during the COVID-19 pandemic (April 2020) (Rossell et al., 2021). Cohen's  $d$  is reported, with qualitative descriptors for effect sizes: Small (0.20), Medium (0.5), Large (0.8) and Very large (1.3) (Rosenthal, 1996).

Associations were investigated between DASS-21 subscale scores and demographic and study characteristics, COVID-19 contact status and self-rated general health. DASS-21 subscale scores all had a significant non-normal distribution; therefore, Mann-Whitney U-tests, Kruskal Wallis tests or Spearman's  $\rho$ -coefficients were used, as appropriate. For post-hoc pairwise comparisons, significance values were adjusted by the Bonferroni correction for multiple tests. Variables significantly associated with any of the subscale scores ( $p < 0.05$ ) were included in simple multiple regression models, with DASS-21 Depression, Anxiety and Stress subscale scores as outcome variables. Preliminary analyses were conducted to ensure that assumptions of multicollinearity were not violated; Tolerance values of  $> 0.1$  and Variance Inflation Factors (VIF) of  $< 10$  were considered acceptable.

## **Results**

Of the 2,907 undergraduate nursing and midwifery students who were e-mailed invitations, 638 (22%) completed a survey. Most ( $n=593$ , 93%) identified as women, and were born in Australia ( $n=445$ , 69.7%); approximately 10% ( $n=65$ ) lived with dependent children. More than a quarter ( $n=170$ , 27%) were in their first year of study (Table 1).

Three respondents had been diagnosed with COVID-19, and 56 (9%) had been in direct contact with people who had a COVID-19 diagnosis and had undergone self-isolation and testing (with negative results).

Mean scores for nursing and midwifery students were 7.5 (in the moderate range) for depression, 4.9 (in the mild range) for anxiety and 8.7 (in the severe range) for stress. Mean scores on all DASS-21 subscales were

**Table 1:** Demographic, educational and employment characteristics (n=638).

Characteristics	n, %	Mean, SD
Gender, identify as:		
Woman	593 (92.8)	
Man	38 (6.1)	
Non-binary/other/prefer not to disclose	7 (1.1)	
Age, years		23.56 (6.8)
Lives alone		
Yes	71 (11.1)	
No [of whom living with dependent children]	567 (88.9) [65/567 (10.2)]	
Country of birth		
Australia	445 (69.7)	
Other [of whom international students]	193 (30.3) [137/193 (71.0)]	
Working in a voluntary or paid position since March 2020		
No	187 (29.3)	
Yes	451 (70.7)	
Campus enrolled		
City	385 (60.3)	
Regional	213 (33.4)	
Rural	40 (6.3)	
Degree enrolled		
Three-year BN <sup>a</sup>	486 (76.2)	
Four-year combined degree <sup>b</sup>	152 (23.8)	
Year of degree		
First	170 (26.6)	
Second	208 (32.6)	
Third/fourth	260 (40.8)	

<sup>a</sup>BN and BN (Clinical Leadership). <sup>b</sup>BN/Bachelor of Midwifery, BN/Bachelor of Psychological Sciences and BN/Public Health and Health Promotion. BN, Bachelor of Nursing.

statistically significantly higher ( $p < 0.001$ ) than means from the comparative data. Compared to Australian normative data (all ages), effect sizes were large for Depression and Stress scores, and medium for Anxiety scores. All effect sizes were medium compared to Australian normative data (ages 18–24) and data from a sample of nurses and midwives working in a hospital in Australia in May to June 2020. Effect sizes were small or negligible for all subscales compared to data from a large Melbourne sample of university students before the pandemic and a sample of young adults (ages 18–24) with no mental health diagnoses in Australia in April 2020 (Table 2).

More than a third of nursing and midwifery students reported moderate to severe symptoms of anxiety (37.2%) and stress (40.2%); almost half (48.5%) reported moderate to severe symptoms of depression. Notably, at least a quarter of students reported severe or extremely severe symptoms of depression (29%), anxiety (25%) and stress (25%) (Table 2).

In univariate analysis, being a woman, being younger, having completed more years of study and having poorer self-rated general health were all significantly associated ( $p < 0.05$ ) with higher scores on at least one DASS-21 subscale. Being an international student and having dependent children living at home were each significantly associated ( $p < 0.05$ ) with lower scores on at least one subscale. These variables were therefore included in the regression models. Not being born in Australia was also significantly associated with lower subscale scores but was not included owing to substantial overlap with the international student status variable. In the multiple regression analyses (Table 3), being a woman, being younger and reporting poorer general health were significantly associated with higher DASS-21 Depression and Stress scores. Being an international student was associated with lower DASS-21 Depression and Stress scores. Being a woman, being

**Table 2:** DASS-21 subscale mean scores and proportions in clinical ranges.

Scale	Mean, SD	Means (SD) for existing Australian data; effect size					Ranges for clinical cut-off points <sup>e</sup>	n, % in clinical ranges
		Adults (all ages) <sup>a</sup>	Adults (age 18–24) <sup>a</sup>	University students pre-pandemic <sup>b</sup>	Nurses & midwives 2020 <sup>c</sup>	Adults (age 18–24) 2020 <sup>d</sup>		
DASS-21 Depression (range 0–21)	7.51 (5.56)	2.57 <sup>f</sup> (0.89); L	3.96 <sup>f</sup> (0.64); M	5.1 <sup>f</sup> (0.43); S	3.25 <sup>f</sup> (4.13); M	6.29 <sup>f</sup> (5.33); S	Normal (0–4) Mild (5–6) Moderate (7–10) Severe (11–13) Extremely severe (14+)	230 (36.2) 98 (15.4) 125 (19.7) 65 (10.2) 118 (18.6)
DASS-21 Anxiety (range 0–21)	4.93 (4.19)	1.74 <sup>f</sup> (0.76); M	2.76 <sup>f</sup> (0.52); M	4.10 <sup>f</sup> (0.20); N	2.74 <sup>f</sup> (3.02); M	3.67 <sup>f</sup> (3.93); S	Normal (0–3) Mild (4–5) Moderate (6–7) Severe (8–9) Extremely severe (10+)	301 (47.3) 98 (15.4) 75 (11.8) 59 (9.2) 103 (16.2)
DASS-21 Stress (range 0–21)	8.69 (3.68)	3.99 <sup>f</sup> (0.90); L	4.78 <sup>f</sup> (0.75); M	6.85 <sup>f</sup> (0.35); S	5.23 <sup>f</sup> (4.45); M	6.83 <sup>f</sup> (4.80); S	Normal (0–3) Mild (4–5) Moderate (6–7) Severe (8–9) Extremely severe (10+)	286 (45.0) 94 (14.8) 95 (15.0) 98 (15.4) 62 (9.8)

<sup>a</sup>Crawford, Cayley, Lovibond, Wilson, & Hartley, (2011). <sup>b</sup>Larcombe et al. (2014). <sup>c</sup>Holton et al. (2020). <sup>d</sup>Rossell et al. (2021).

<sup>e</sup>Lovibond and Lovibond (1995). <sup>f</sup>Sample values significantly higher than means for comparative data at  $p < 0.001$ ; Effect sizes N, negligible; S, small; M, medium; L, large.

**Table 3:** Multivariate regression models.

	Depression			Anxiety			Stress		
	Beta	t	p-Value	Beta	t	p-Value	Beta	t	p-Value
Gender (woman)	-0.086	-2.380	0.018	-0.114	-3.114	0.002	-0.126	-3.426	0.001
Age	-0.102	-2.355	0.019	-0.110	-2.540	0.011	-0.097	-2.217	0.027
Children living at home	-0.078	-1.879	0.061	-0.029	-0.693	0.488	-0.030	-0.708	0.479
International student	0.109	2.934	0.003	0.058	1.554	0.121	0.157	4.194	<0.001
Year of study	-0.052	-1.400	0.162	0.088	2.342	0.019	0.028	0.745	0.457
General health	-0.423	-11.786	<0.001	-0.427	-11.810	<0.001	-0.382	-10.502	<0.001
	R <sup>2</sup> =0.214			R <sup>2</sup> =0.205			R <sup>2</sup> =19.3		

younger, having completed more years of study and reporting poorer general health were significantly associated with higher DASS-21 Anxiety scores.

## Discussion

In this study, a substantial proportion of a sample of undergraduate nursing and midwifery students enrolled at an Australian university reported significant psychological distress during the COVID-19 pandemic in Victoria in 2020. Mean scores on all three subscales were significantly higher than for all other Australian comparison studies, although smaller effect sizes were observed when scores from our sample were compared with young Australian adults (age 18–24) in pre-pandemic (Crawford et al., 2011) and pandemic (Rossell et al., 2021) conditions. This suggests that most undergraduate students find themselves in a vulnerable age group in

terms of risk of psychological distress, but during the COVID-19 pandemic, nursing and midwifery students experienced even higher levels of depression, anxiety and stress than their peers in a similar age group.

In our study, more than a third of students reported moderate to severe symptoms of anxiety and stress, with mean stress scores in the severe range for this subscale. This is substantially higher than the proportion reporting moderate to severe symptoms of anxiety or stress on the DASS-21 among nurses and midwives during the first wave of the COVID-19 pandemic in Melbourne (15% for each) (Holton et al., 2020) and among healthcare workers in India and Singapore during February to April 2020 (9% and 2% respectively) (Chew et al., 2020a). Experiences of anxiety and stress among undergraduate nursing students have been reported during the SARS epidemic (Wong et al., 2004) and the COVID-19 pandemic (Collado-Boira et al., 2020; Kochuvilayil et al., 2021; Savitsky et al., 2020; Zhi et al., 2020). These experiences are perhaps unsurprising, given many undergraduate nursing and midwifery students undertook clinical placements during the pandemics. This may have caused concern about caring for patients with suspected or confirmed diagnosis, fear of becoming infected, as well as the possibility of transmission to family and friends (Swift et al., 2020). As well, adjusting to the rapid change from a face-to-face to an online learning environment, students may have experienced a lack of familiarity and confidence with remote learning for theory-based content, computer literacy concerns and connectivity challenges (Baloran, 2020; Masha'al et al., 2020). Due to the very short on-campus learning time before lockdown, students may have felt unprepared for learning in the clinical environment (Collado-Boira et al., 2020; Zhi et al., 2020) and concerned about the potential negative impact of the pandemic on their educational preparation, graduation and career path as they progressed towards becoming a registered health professional at a time when the demand for qualified nurses and midwives is high (Dewart, Corcoran, Thirsk, & Petrovic, 2020; Lovric, Farcic, Miksic, & Vcev, 2020).

Prior to this study, scant research had assessed psychological wellbeing using validated scales among undergraduate nursing and midwifery students during COVID-19 and other pandemics. To date, no studies have assessed depression. In our study, half of the students reported moderate to severe symptoms of depression, which is substantially higher than even the upper bound of the confidence interval (40%) of the prevalence of depression established in a meta-analysis of studies among nursing students before the COVID-19 pandemic (Tung et al., 2018). It is also higher than the proportion reporting moderate to severe symptoms of depression on the DASS-21 among nurses and midwives during the first wave of the COVID-19 pandemic in Melbourne (16%) (Holton et al., 2020) and among healthcare workers in India and Singapore during February to April 2020 (5%) (Chew et al., 2020a). The mean depression score for the sample in this study fell in the moderate range of the DASS-21 depression subscale. Students' mood may have been negatively impacted by fewer opportunities for 'face-to-face' interactions with fellow students and academics, which can lead to a sense of isolation (Lovric et al., 2020; Masha'al et al., 2020).

In this study, younger, female students with lower self-reported general health status were more likely to have higher levels of depression, anxiety and stress. This is in line with Savitsky et al. (2020) who found that female nursing students reported more anxiety than male students during the COVID-19 pandemic. Lim et al., reported, that the prevalence of depression was significantly higher among women than men, in an international meta-analysis before the COVID-19 pandemic (Lim et al., 2018). In addition, in our study, completing more years of education was associated with higher anxiety scores which may relate to concerns about timely completion of degrees due to uncertainty in schedules and feeling inadequately prepared for the clinical skills and demands that may be required on entering the healthcare workforce. Although many factors in students' lives could contribute to their psychological distress, these data provide some indication which characteristics may make students particularly vulnerable during a pandemic such as COVID-19. Interestingly, being an international student was associated with lower scores on the depression and stress scales. It is possible international students may have felt relieved not to be in their country of origin given Australia's relatively low number of COVID-19 cases compared to other countries (World Health Organization, 2020b). In addition, international students tended to be older than domestic students and therefore, may have had more life experience.

## Limitations, strengths and suggestions for future research

This was a cross-sectional study and therefore, it is difficult to draw firm conclusions about the impact of COVID-19 on students' psychological wellbeing without access to baseline pre-pandemic data. It is possible that, with the sustained or recurring lockdowns and potential clinical exposure to patients with positive diagnoses of COVID-19, the prevalence of depression, anxiety and stress among nursing and midwifery students may have changed as the pandemic progressed. However, among the general population in China, no significant changes in depression, anxiety or stress were detected over a four-week period (Wang et al., 2020).

An additional limitation was that the study used a self-report questionnaire (DASS-21) to assess psychiatric symptoms and did not make clinical diagnoses; the results are indicative only. The gold standard for establishing a psychiatric diagnosis includes structured clinical interview and functional neuroimaging (Husain et al., 2020).

The response rate was low (22%) and hence, the findings cannot be generalized to all nursing and midwifery undergraduate students at the study university. Students who chose to participate may have been among the most – or the least – distressed. The findings from the multivariate analyses should be considered with caution, as the amount of variance explained by the independent variables in each model is low at approximately 20%, suggesting that many other factors which were not assessed in this study contributed to symptoms of depression, anxiety and stress. Qualitative studies are recommended to identify nursing and midwifery students' experiences of the COVID-19 pandemic, and factors which may be contributing to their distress. Quantitative studies should also be designed to investigate whether participation in clinical placements or early inclusion in the healthcare workforce (Swift et al., 2020; Tran et al., 2020) contributes to psychological distress among nursing and midwifery students, or whether the altruistic experience of joining the healthcare sector's efforts against the pandemic may reduce psychological distress in this cohort. Future studies could also investigate associations between students' vaccination status and psychological distress. A recent study among healthcare workers in Asia showed that more than 95% were willing to receive the vaccine with the main drivers being perceived susceptibility to the pandemic and a pro-social mindset (Chew et al., 2021). It is therefore possible that psychological distress will be significantly decreased among vaccinated students, compared to those who are not vaccinated.

Although the response rate was low, which is not unusual for unsolicited surveys during pandemics (Holton et al., 2020), the sample size was relatively large. A strength of this study is the use of a validated psychometric instrument to assess symptoms of depression, anxiety and stress. Whilst feelings of sadness were reported in a study of undergraduate nursing and medical students during COVID-19 in Spain (Collado-Boira et al., 2020), we are unaware of previous studies assessing depression among undergraduate nursing or midwifery students.

## Implications for nursing and midwifery undergraduate education

The results of this study can inform educational, psychological and occupational support responses at academic institutions delivering undergraduate nursing and midwifery education, and strategic planning for future infectious disease outbreaks. The high prevalence of clinically significant depression symptoms found in this study suggests strategies may need to be considered to prevent or mitigate high levels of depression. For example, cognitive behavioral therapy (CBT) is recommended to address the psychological impact of COVID-19 (Ho, Chee, & Ho, 2020). A viable option for nursing and midwifery students who are experiencing symptoms of depression during the pandemic may be internet-based CBT, which is accessible and available during physical distancing restrictions and while the demand for in-person treatment providers is high. Internet-based CBT has been shown to be efficacious in treating psychiatric disorders such as post-traumatic stress disorder (Sijbrandij, Kunovski, & Cuijpers, 2016), anxiety (Olthuis, Watt, Bailey, Hayden, & Stewart, 2016) and insomnia (Soh, Ho, Ho, & Tam, 2020) and cost-effective options for internet-based CBT are available (Zhang & Ho, 2017).



As poorer general health status was associated with higher scores on all three subscales of the DASS-21 in this study, it is recommended that university medical services and other general practice clinics consider screening undergraduate students for depression, anxiety and stress when they present with symptoms of poor physical health during or after a pandemic. The findings of this study underline the importance of counseling support and clear, low-cost treatment referral pathways for nursing and midwifery students. Support and treatment should address students' specific experiences of depression, anxiety, stress or comorbid conditions. Poor psychological wellbeing can impact students' successful completion of their studies and therefore has implications for nursing and midwifery workforce recruitment and retention.

## Clinical resources

Mental health and psychosocial considerations during the COVID-19 outbreak, 18 March 2020 <https://apps.who.int/iris/bitstream/handle/10665/331490/WHO-2019-nCoV-MentalHealth-2020.1-eng.pdf>.

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**Informed consent:** Informed consent was implied by completion of the survey; this was clearly stated at the beginning of the survey and in the Plain Language Statement.

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