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Impact of COVID-19 on paramedicine students: A mixed methods study

Brett Williams *, Christine King, Brendan Shannon, Cameron Gosling

Department of Paramedicine, Monash University, VIC, Australia

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ABSTRACT

Background: Viral epidemics have negative and sometimes extreme impacts on psychological well-being, particularly in health care workers. Studies have reported higher levels of depression, anxiety, insomnia, stress, distress, fear, burnout, and post-traumatic symptoms.

Objective: This research aimed to explore the psychological impacts of COVID 19 on paramedicine students.

Methods: A convergent mixed method design study was undertaken using self-reporting instruments and qualitative interviews.

Results: Responses were received from 151 students (38.3% responses rate). Most students experienced some level of anxiety (62%), although severe levels were only reported by 6% of respondents. Students had significantly greater odds (OR = 2.05, p = 0.045, 95% CI: 1.02, 4.12) of higher anxiety levels if they were female. Thematic analysis of the interviews largely supported these results, with themes focused on changing approaches to study, financial situation, social support, University adaptation, acceptance and career pathway choice.

Conclusions: This study identified and explored the anxiety and coping strategies in an undergraduate paramedicine cohort when faced with a viral epidemic. Although most of the responding paramedic students reported above normal levels of anxiety in the initial stages of the COVID-19 outbreak, many students, with the help of learning, financial and social support, and a range of positive coping strategies, have adapted well to the impact of the pandemic and associated lockdown period.

1. Introduction

Viral epidemics have negative, and in some cases, extreme impacts on psychological well-being, particularly in health care workers. Studies from across the globe have reported impacts such as higher levels of depression, anxiety, insomnia, stress, distress, 'worry and fear', burnout, and post-traumatic symptoms [1–6]. Psychological wellbeing is known to be worse for women, nurses, front line health care workers, workers in 'hot spots' of disease outbreak, workers with less social support, and those with less self-efficacy [6–8]. Further, it was found that there was a difference in wellbeing between frontline nurses and other health workers who did epidemic related tasks and nurses and other frontline health workers who did not [9,10] and frontline nurses and other health workers who had contact with patients with the virus and those that did not [11,12]. While the determinants of what causes increased psychological illness during viral epidemics or pandemics are many, one COVID-19 study reported levels of anxiety, stress, and self-efficacy were dependent on both sleep quality and social support [13].

The need for psychological support (e.g. counselling) and educational interventions is a common conclusion across studies. The evidence supporting the use of educational and counselling interventions to improve mental health, disease literacy, and confidence is mixed. Al Knawy, Al-Kadri [1] found that staff capacity to handle a viral outbreak was reduced by the high anxiety resulting from a lack of appropriate staff counselling and mental health support. In their study, they found that almost all frontline participants strongly and repeatedly expressed the need for counselling and mental health support of employees. Alsahafi and Cheng [2] assessed the knowledge, attitudes, and behaviours of health-care workers after a viral outbreak and found that knowledge was poor and further education and training programs were needed, particularly concerning infection control practices. Of these health-care workers, almost two-thirds reported having psychological problems during the outbreak including anxiety about contracting the virus themselves. However, some evidence points to the fact that when health care workers feel confident in infection control measures and have adaptive responses to stress, their levels of stress are comparable to non-healthcare workers (Chua, Cheung [14]).

Brooks, Dunn [15] concluded that for future outbreaks of infectious

* Corresponding author at: Department of Paramedicine, Monash University, McMahons Road, VIC 3199, Australia.
E-mail address: brett.williams@monash.edu (Brett Williams).

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diseases, healthcare workers should be prepared for potential psychological impacts and workplaces should be ready to provide psychological support and educational interventions. There is a limited understanding of what these interventions might look like, although Jiang, Deng [16] did evaluate the effectiveness of remote psychological consultations services in the recent COVID-19 outbreak and found that they cannot replace face-to-face onsite services. This suggests that the former should only be used as a temporary back-up in exceptional circumstances.

There are no studies specifically focusing on the psychological impacts on paramedics in viral epidemics. With viral epidemics, paramedic studies focus on infection rates and exposure trends and conclude that paramedics are at greater risk of acquiring infectious diseases compared to the general population [17–19]. However, studies assessing the psychological impact of other disasters on medical responders found a lack of social support and communication, maladaptive coping, and lack of training were important risk factors for developing negative psychological impacts post the event. There are also no studies of the psychological impacts of viral epidemics on paramedicine students, who are our future frontline medical responders.

The objective of this study was to explore the psychological impacts of COVID 19 on paramedicine students and the different coping strategies these students used to overcome these impacts. In addition to impacts and coping strategies, the study also sought to gain student perspectives on strategies that could be implemented now, so that they and their frontline healthcare colleagues had less chance of being at risk of developing mental health problems during viral epidemic outbreaks in the future.

2. Methods

2.1. Research questions

RQ1: How anxious are paramedicine students during the current COVID-19 pandemic?
RQ2: Are paramedicine students coping with the current COVID-19 pandemic?
RQ3: Is there a relationship between paramedicine students' anxiety and their coping strategies?
RQ4: What strategies and interventions can be developed to reduce the effects of viral epidemics or pandemics on paramedics and paramedicine students in the future?

2.2. Study design

A convergent mixed method design study was undertaken using self-reporting instruments and qualitative interviews with a convenience sample of undergraduate paramedicine students from a large Australian University. The convergent mixed methods design is a common mixed methods research strategy [20,21]. The self-reporting instruments used multivariate statistics and the qualitative interviews used semi-structured and open-ended questions to gain in-depth accounts of students' experiences. Mixed methods research has been described as giving a deeper and richer understanding of a problem, where both qualitative and quantitative approaches are used together to explain, explore, and/or triangulate findings [22].

2.3. Population and setting

The study was conducted at the Department of Paramedicine, Monash University, Victoria, Australia. Monash University offers a three-year Bachelor of Paramedicine which provides employment opportunities to become paramedics in Australia and overseas. All undergraduate paramedicine students were invited to participate in the study, with the only inclusion criteria being that students were currently enrolled in the aforementioned program. Enrolment in the study occurred during April 2020.

2.4. Instrumentation

Student anxiety and coping levels were measured using well established standardised self-reporting instruments: 7-item Generalised Anxiety Disorder Scale (GAD-7) [23] and the Brief-COPE Scale [24]. The GAD-7 is a 7-item scale developed to measure symptoms of generalised anxiety. Each item is rated on a 4-point Likert-rating scale (1 = not at all to 4 = nearly every day) with higher scores indicating more severe generalised anxiety symptoms. The GAD-7 has evidence of good reliability, validity, and stability over time in numerous primary health care settings [25,26]. The Brief-COPE Scale is a 28-item self-report scale developed to measure ways individuals cope with stressful events. It uses a 4-point Likert-rating scale (1 = I haven't been doing this at all to 4 = I've been doing this a lot) and is scored based on 14 sub-scales: Self-distraction, Active coping, Denial, Substance use, Emotional support, Use of informational support, Behavioural disengagement, Venting, Positive reframing, Planning, Humour, Acceptance, Religion, Self-blame. The Brief-COPE Scale has good reliability and validity across multiple health and cultural groups [25,27].

2.5. Analysis method

Data were collated and assessed for normality using skewness and kurtosis. Data are reported using frequency, mean (standard deviation), and medians (interquartile range) where appropriate. Kruskal-Wallis and Mann-Whitney U Tests were used to assess anxiety level differences between sex, year of study, residence, income if students lived at home with their parents and if relatives or acquaintances had contracted COVID-19. Items that were significant in univariate testing were entered into the multivariate ordinal logistic regression model. The strength of association was reported using odds ratios (OR) and 95% confidence intervals (CIs). The relationship between the COPE score domains and anxiety scores were determined using Spearman's correlation coefficient. All tests were two-tailed unless otherwise stated, results were considered statistically significant if the p-value was < 0.05. All statistical analyses were performed on Stata statistical software version 16.0 (StataCorp, College Station, Texas, USA).

Qualitative interview data were analysed using content analysis as described by Vaismoradi, Turunen [28] where content analysis is similar to a thematic analysis by cutting across data and searching for patterns and themes but differs in that it is possible to quantify data by measuring the frequency of categories and themes, which cautiously may stand as a proxy for significance. Simple cut and paste techniques in Microsoft Word were used to collate responses and identify and group themes. NVivo (version 12) was also used to cross-check collating and look for deeper insights using word search and frequency. This allowed for linkages to be identified through coding responses.

2.6. Ethics approval

Ethics approval was granted by the Monash University Human Research Ethics Committee (#24397). Students were invited to participate in the study via their learning management system, this included the study's explanatory statement, consent forms, and advised that the study was voluntary. The questionnaires were available for two weeks online using Qualtrics and a follow-up for participation in interviews was undertaken by one of the research members (CK).

3. Results

3.1. Participants

A total of 151 students took part in the larger online self-reporting survey (38.3% response rate) using the Generalised Anxiety Disorder

Scale (GAD-7) and the Brief-COPE Scale. Survey respondents comprised of 74.8% female, 24.8% male and 1.4% who preferred not to say. These percentages were representative of the paramedicine student cohort. Seventeen students took part in the smaller in-depth interviews, with14 identifying as female, 3 as male, and 1 as non-binary.

3.2. The generalised anxiety Disorder Scale (GAD-7) and Brief-COPE Scale

The GAD-7 showed that at the time of taking the survey 35% of students were experiencing mild anxiety levels, 21% experiencing moderate anxiety levels and 6% were experiencing severe levels of anxiety (Table 1).

In terms of the Brief-COPE Scale, the main forms of coping used by students were Self-Distraction, Reframing, Humour, Active Coping, and using Instrumental Support (Table 2). Coping strategies used the least were Denial, Substance Use, Behavioural Disengagement, and Venting.

Table 3 illustrates the anxiety levels across a range of variables including gender, year level, geographical location, income stability, living arrangement, and whether or not the student knew a person who had contracted COVID-19. Results show that more female students were experiencing anxiety after the COVID-19 outbreak. Mild and moderate anxiety was higher for female students, however, the proportion of both male and female students experiencing severe levels of anxiety was similar (i.e. 5.6 and 5.3%). Severe levels of anxiety were also experienced more by 1st-year students (11.4% of 1st years), however, fewer 2nd-year students experienced normal levels of anxiety overall (31.9%). There was a significant ($p = 0.033$) difference between rural and urban-dwelling locations on anxiety levels. Moderate or severe anxiety was reported by 40.7% of rural-based students compared to 24.1% of urban students. Students without a steady income experienced higher levels of anxiety as did students not living with parents, although neither of these variables was significant ($p = 0.067$; $p = 0.221$ respectively). Whether or not a student knew of a person who had contracted COVID-19 did not impact overall anxiety levels.

Table 4 illustrates the correlations between coping strategies and anxiety levels. Significant positive correlations were reported between anxiety levels and behavioural disengagement, planning, self-blame, self-distraction, denial, acceptance, and religion. All other correlations were non-significant.

The results of the multivariate regression are presented in Table 5. Students had significantly greater odds (OR = 2.05, $p = 0.045$, 95% CI: 1.02, 4.12) of higher anxiety levels if they were female compared to males. While the odds of higher anxiety levels were also noted for students who were in the second year and rurally based, these findings were not statistically significant.

3.3. The semi-structured interviews: paramedicine student perceptions

3.3.1. Changes in University Studies

Almost all interviewed students (n = 17) noted that the first few weeks of transition to online learning and working from home was difficult. The main difficulties were uncertainty, getting into a routine, not having face-to-face tutorials to help understand the theory, and not learning face-to-face with other students. Students that said that they accepted the situation early also stated that they had coped quite well with the transition. Some students were still having difficulties at the time of the interviews while other students were feeling on top of their studies. The phrase "Doing the best with what we've got" was used by many students. One student was a parent and had an additional set of issues trying to home school and complete assignments at the same time.

> "It's going really well now … but it took a couple of weeks to get into a routine … I needed to find a different way to be motivated … a new routine."
> "The overall transition has been relatively ok … but learning the content online is difficult for me. I am a 'learn by doing' person … so I am struggling with that aspect of it."

3.3.2. Changes in financial situation

14 out of the 17 students had lost their job/s because of COVID-19 with the number of hours they worked between 6 and 30 hrs/week. Students coping with COVID-19 depended heavily on whether they were coping financially, which was heavily dependent on whether or not they accessed government welfare support payments (i.e. 'job keeper' or 'job seeker'), or were living at home with parents. Those that were not living at home with parents and could not access job keeper had to apply for job seeker and either moved back home with parents or relied on housemates to support them while they found alternative work or obtained government welfare payments. 3 students who lived at home spoke of the stress they were experiencing because one or both of their parents had significantly reduced or no income because of COVID-19 enforced restrictions. Students that could not access financial support reported experiencing higher levels of anxiety and stress than they felt was normal. Students that accessed financial support reported feeling less anxious and stressed than they had in years. No students who were interviewed had deferred however 6 students mentioned knowing other students who had deferred because they could not access financial support.

> "I am fortunate that I live at home so I still have a roof over my head … but I don't have money now for my car … my job shut down … but I went out and got another one … there's no real measurable effect."
> "Both of my jobs had to stop … so I am on 'Job Keeper' … and I am earning double so financially I am fine. In fact, I am less stressed than I have ever been … I can pay my rent … and I am actually finding time to study and have a routine."
> "I lost my job and so did my mum. I am pretty worried. But we have adapted to have a business online but it is nothing in comparison. I also had to move home. It's really stressful."

Table 1
GAD-7 Anxiety Results Anxiety Level Categories

Anxiety Level	Number	Percentage
Normal	57	37.75
Mild	53	35.1
Moderate	32	21.19
Severe	9	5.96
Total	151	100

Note. Anxiety Levels (GAD-7): Mean (SD) = 7.67 (4.85), Median (IQR) = 7 (4 – 7), Range = 0 – 19.

Table 2
COPE Scores: Median (IQR).

COPE Domain	Median (IQR)
Self-distraction	6 (4 – 7)
Active Coping	5 (4 – 7)
Denial	2 (2 – 2)
Substance Use	2 (2 – 3)
Use of Emotional Support	4 (4 – 6)
Use of Instrumental Support	5 (4 – 6)
Behavioural Disengagement	2 (2 – 3)
Venting	2 (2 – 3)
Positive Reframing	6 (4 – 6)
Planning	4 (3 – 5)
Humour	6 (5 – 7)
Acceptance	4 (4 – 5)
Religion	4 (3 – 5)
Self-Blame	4 (3 – 5)

Table 3
Univariate Anxiety Comparison.

Variable	Total n (%)	Normal n (%)	Mild n (%)	Moderate n (%)	Severe n (%)	Statistics	P
Gender						6.64+	0.036
Male	36 (23.8)	20 (55.6)	8 (22.2)	6 (16.7)	2 (5.6)		
Female	113 (74.8)	37 (32.7)	44 (38.9)	26 (23)	6 (5.3)		
Prefer NTS	2 (1.3)	0	1 (50)	0	1 (50)		
Year Level							
Yr 1						8.56+	0.014
Yr 2	35 (23.2)	14 (40)	10 (28.6)	7 (20)	4 (11.4)		
Yr 3	69 (45.7)	22 (31.9)	25 (36.2)	18 (26.1)	4 (5.8)		
	47 (31.1)	21 (44.7)	18 (26.1)	7 (14.9)	1 (2.1)		
Residence						−2.134*	0.033
Urban	124 (82.1)	53 (42.7)	41 (33.1)	24 (19.3)	6 (4.8)		
Rural	27 (17.9)	4 (14.8)	12 (44.4)	8 (29.6)	3 (11.1)		
Steady Income						−1.83*	0.067
Yes							
No	118 (78.2)	46 (39)	46 (39)	21 (17.8)	5 (4.2)		
	33 (21.9)	11 (33.3)	7 (21.2)	11 (33.3)	4 (12.1)		
Lives with Parents						−1.224*	0.221
Yes							
No	90 (59.6)	34 (37.8)	38 (42.2)	15 (32)	3 (3.3)		
	61 (40.4)	23 (37.7)	15 (24.6)	17 (27.9)	6 (9.8)		
COVID-19						−0.324*	0.746
Yes	7 (4.6)	3 (42.9)	2 (28.6)	2 (28.6)	0		
No	144 (95.4)	54 (37.5)	51 (35.4)	30 (20.8)	9 (6.25)		

+ Kruskal-Wallis test
* Mann-Whitney *U* test

Table 4
COPE Scores and Anxiety Level Correlation (Spearman's)

COPE Domain	Correlation (r)	P
Self-distraction	0.290	<0.001
Active Coping	−0.09	0.223
Denial	0.230	0.004
Substance Use	0.139	0.088
Use of Emotional Support	0.099	0.223
Use of Instrumental Support	−0.026	0.746
Behavioural Disengagement	0.377	<0.001
Venting	0.147	0.071
Positive Reframing	−0.099	0.223
Planning	0.209	0.009
Humour	0.111	0.172
Acceptance	0.198	0.014
Religion	0.1937	0.0172
Self-Blame	0.239	0.0031

Table 5
Ordinal Logistic Regression.

Factor	Number	Odds Ratio	95% Confidence Interval	P
Year Level				
- Year 1	35	Reference		
- Year 2	69	1.39	0.66, 2.91	0.385
- Year 3	47	0.58	0.26, 1.30	0.183
Gender				
- Male	36	Reference		
- Female	113	2.05	1.02, 4.12	0.045
- Prefer NTS	2	12.13	0.3, 488.66	0.186
Residence				
- Urban	124	Reference		
- Rural	27	1.61	0.75, 3.45	0.219

3.3.3. Changes in social support

All 17 students stated that they were communicating regularly with key groups of people; particularly face to face with family if living at home, or with flatmates if living away from home. Many students distinguished between university zoom meetings that they took part in for their learning or for clarification versus social zoom meetings that they had with friends to relax and talk about life in general. Some students stated they had more communication with the core friendship group and less with other friends. Students living at home highlighted that they had more communication with immediate family and less with other families. Students living away from home stated that their communication had increased with their flatmates and was less with family. Students also spoke of their increased phone and social media communication to make up for lost personal interactions, where some students felt that this was an adequate substitute and others found it limiting.

> "I reckon I have a lot of social support. I came back to my family and I keep in contact with my friends and we call each other daily."
> "My social support is mainly my housemates. We have lived together a while and we are good at communicating … and we just made a decision to do things to cope together. I also have a weekly check-in with dad and my friend group has Friday night drinks on skype. Some days are a bit sad … but I have chosen to surround myself with positive people."

3.3.4. University adaptation and support

The general perspective from students was that the paramedicine Faculty responded quickly and did the best job that they could do at the time given the circumstances. Students empathised with the situation their lecturers were in. All students stated that they felt that their lecturers were doing their best (and above and beyond), but 12 out of the 17 students felt that their lecturers needed more support (e.g. needing extra tutors), saying that how lecturers cope influences how they cope. Three of the students mentioned experiencing the brunt of a lecturer not coping and when they tried to reach out, they were not heard. Students commented on the University overall saying that it had adapted well and had been quite flexible, however, there were some concerns raised about continuing to charge full fees, particularly to international students; and residential services charging rent, and student amenities only being reduced by 25%.

> "It's hard because I think they have done the best they can … but I don't really know anyone … and if I was on campus it would have been easier. Zooms haven't been great and they're inconsistent … and I don't feel like I can ask for clarification … so I have felt alone."
> "I think our department did well in the early days and they continue to. In terms of the whole university, I think the teachers need more

support. I am doing well … and I think other students are … but I don't think our teachers are."

3.3.5. Main causes of anxiety and stress since the outbreak

When asked about what they were most worried about since the outbreak, 6 students were most worried about family and vulnerable relatives (e.g. children, grandparents); 6 were most worried about how their studies were being affected (e.g. competency, motivation); 5 were most worried about the uncertainty about '*getting back on our feet*' (e.g. the economy, international security, air travel, social distancing, and job prospects); and one student was most worried about job opportunities. Almost all students were worried about getting a job in paramedicine however this worry was there before the outbreak. Although students were able to say what they were most worried about, most were worried about multiple issues, for example:

"I just don't want to spread COVID and kill anyone … that is my biggest worry … I can get through my studies … but spreading it around…but I am also worried about my mum being able to support herself … and my nanna is quite sick too."

3.3.6. Student behaviour change, coping strategies, and adaptation

In the in-depth interviews, students were asked if they experienced any changes in their behaviour in terms of coping since the outbreak. The different ways that students coped with changes since the COVID-19 outbreak are reflected in the following 3 comments:

"I don't think so – I am pretty resilient – I don't struggle with change – I have adjusted pretty well – exercising has helped"
"Been more positive than I have been – more open-minded and more perspective. And be able to see every side of it because I am not stressed or bogged down"
"A little bit more impatient than I used to be – stuck with the same people the same time- small things start bugging you."

Students were asked to comment on 4 correlations found in the larger survey study. These were religion/spirituality, self-blame, self-distraction, and accepting the situation.

3.4. Religion/spirituality

Out of the 17 students, 1 student stated that they were religious and continuing this in isolation to help them cope, 4 students mentioned that they were engaging in more spiritual or meditative activities, 2 said they had taken up Yoga, and 10 students said it did not relate to them. Of these 10 students, 3 said their parents were either religious or spiritual and still practicing in isolation, and 4 said they had friends who had taken up meditation or yoga during isolation.

3.5. Self-blame

7 of the 17 students identified that they were doing more self-blame now than they were before the COVID-19 outbreak but that this self-blame was indirectly related rather than directly related. Reasons for self-blame included there being more time available in isolation and therefore feeling guilty for not achieving more, having friends to pull them up when they were self-blaming, having more time to think, feeling frustrated with the indirect effects of COVID-19, and spending more time to compare themselves with others on social media. Four other students stated that they had done a lot of work in the past to stop themselves from self-blaming when it was not appropriate.

3.6. Self-distraction

The majority of students recognised that they engaged in some form of self-distraction. Most students stated that they experienced a lot of self-distraction in the first few weeks of isolation. Initially, television, social media, online shopping, and YouTube were all used to distract from the reality of COVID-19. Some students became occupied with watching the news and reading articles on Facebook about COVID-19 but became overwhelmed and stopped. Three students said that they dived into their study to distract themselves initially. Once students accepted what was happening they engaged in less self-distraction and developed a better routine including exercise, cooking, and getting adequate sleep.

3.7. Acceptance of the situation

All students identified with this correlation. Interview data showed that in general, the quicker students accepted the situation the better they were at coping with the situation and put in place constructive ways to move forward. Three students noted the importance of educating themselves early and early recognition. Several students pointed out the link between anxiety and not accepting something that was out of your control. There were noticeable differences between the year levels. Students in their first year of university struggled the most in terms of their study, which considering they had no formal orientation nor any face to face learning this is not to be unexpected. They had also not had a chance to meet and make friends with people at university who they could then call on for additional help or to share their frustrations.

3.7.1. Choosing paramedicine and clinical placements

In response to the question of whether students had second thoughts about choosing paramedicine after the COVID-19 outbreak, 16 of the 17 students said they had no second thoughts. The one student that did have second thoughts had only just started paramedicine and said that COVID-19 did give them something extra to think about in terms of continuing paramedicine. More than half of the students said that it reaffirmed their choice and 4 students said that they had a stronger urge to help people in need now than they did before. Many students stated that they came to terms with the danger in the job during their degree. Several students noted that they might feel differently if they had children or had elderly parents. Two students mentioned that COVID-19 had shown them that paramedicine was an economy proof job (e.g. compared with small business). Many students mentioned that they were young and healthy and felt they could overcome the virus if they were to contract it.

In terms of clinical placement, 15 of the 17 students stated that they were not scared of clinical placements and that they trusted the system that the right procedures to keep safe would be put in place. They also acknowledged there was a large emphasis on health and safety in clinical placements before COVID-19. Many students said they would just be more cautious and more aware. Three of the final year students were already working in jobs on the frontline. Students' main concern was giving the virus to someone else and said they would be more careful with social contact if doing placements. Two students were concerned about doing placements, but this was primarily based on contracting and passing the illness on to others.

"What's happened during COVID has reinforced that I don't want to own my own business and would much rather work in an economy proof job such as health … and frontline health."
"If anything, COVID has reaffirmed my choice … would I want to be at home on zoom meetings or be a paramedic?"
"If anything it [COVID] makes me want to be a paramedic more … it's a strong urge to help in times of crisis … I realise I have a helping nature."

Future Strategies for Reducing the Risk of Developing Mental Health Problems. Students were asked for ideas on what they or the University could do now so that in the future, they and their paramedicine colleagues had less chance of being at risk of developing

mental health problems during viral epidemic outbreaks. Interestingly, when students described these they described what was in place now and what they thought would be more helpful in the future (Table 6).

Future strategies identified by students that they believe will help them cope now and moving forward are experiencing coping strategies over being told about them, being more proactive than reactive about services and strategies available, developing critical thinking skills to create and choose strategy options from a toolkit, learning from in-depth stories and case studies, and also ensuring minority groups are represented and considered throughout these strategies.

4. Discussion

COVID-19 has led to strict social distancing measures in Australia even though case numbers have been low compared to other countries. In countries affected the most by the pandemic, there have already been some studies looking at the psychological impact it has caused [6,29]. This study looks at the impact of COVID-19 on Australian undergraduate paramedicine students, the coping strategies they have used, and their suggestions on what they and the University can do now so that in the future, they and their paramedicine colleagues have less chance of developing or exacerbating mental health illness. The result of this study showed that after the COVID-19 outbreak, 35% of students were experiencing mild anxiety levels, 21% experiencing moderate anxiety levels and 6% were experiencing severe levels of anxiety; a total of 61% of students experiencing above normal levels of anxiety. Comparably high-stress levels (53%) have been reported at another Australian university, not during an epidemic [30].

Table 6
Current and future strategies for reducing mental health problems

Now	Future
Tell us about the service and we know it exists	See the application of the program (e.g. peer support program)
Tell us about strategies (e.g. course on mental health, coping with stress)	Get an experience of strategies (e.g. allocate a week for students try it out and share results)
Tell us that diet, sleep and exercise are important for frontline & shift workers	Need to do this in more depth (e.g. nutrition classes) and subsidise activities (e.g. gym)
Wait for people to reach out (i.e. people reach out when it's too late)	Check-in on people (i.e. be more proactive than reactive)
Tell us that is important to talk with someone when you are having problems	Understanding why you need to go and talk to someone (e.g. outside perspective of yourself)
We learn about and major casualties even though they don't happen very often	We can learn about paramedic's mental health issues that might not happen very often
Cover mental health stats and practice issues for the average person (e.g. depression/anxiety)	Cover these for minorities (e.g. different gender identities) to be appropriate (e.g. language)
One-off survey to gain feedback about how students are going with mental health	Regular 5-minute surveys to track progression and change & adapt based on student feedback
Reach out if you are struggling. Reaching out is said because it looks good to say it	Reach out before you are struggling. Take away the effort for reaching out
What mental health issues healthcare workers are more likely to have	How existing healthcare workers have changed their mental health (e.g. podcasts)
Superficial self-reflection and just talking about coping and support.	Self-care coping strategies and how to do deep self-reflection as part of practice.
Talking about stress in future job and strategies to use in the future	Have students implement strategies over exam times and taught and researched by psychologist
Module on mindfulness in first year	Help students create their own toolbox options (mindfulness, yoga, sport) that work for them.
Provide generic support based on assumptions that everyone is mainstream	Provide support to minority students & educate students/staff about them (e.g. transgender)
Zoom used as a substitute for face-to-face teaching in the pandemic.	If pandemic specific more access to counselling sessions through zoom.
Learn about the strategies you might need in the future so you can get a good grade now	Train your mind and form habits now so you benefit now and in the long run

Results showed that more female students were experiencing anxiety after the COVID-19 outbreak. However, the proportion of male and female students experiencing severe levels of anxiety were similar. This was contrary to the study by Lai, Ruktanonchai [31] that showed female health care workers reported more severe degrees of anxiety as well as other mental health illness. Our study also showed that severe levels of anxiety were experienced more by 1st-year students (11%), however, a smaller percent of 2nd-year students experienced normal anxiety levels compared to other groups (32%). Students from rural areas (85%) also experienced anxiety above normal levels, compared with urban students (57%) and anxiety was also higher for students without a steady income and students not living with parents. This is not surprising given the findings of other studies such as Mojs, Warchol-Biedermann [32] who found that students from rural/small town backgrounds and or lower financial status are more likely to become depressed and develop health problems.

The strongest correlations between coping strategies and anxiety levels were found with behavioural disengagement, planning, self-blame, self-distraction, denial, acceptance, and religion, while the correlation with other variables was found to be non-significant ($p > 0.05$). All students either related to the significant coping strategies on a personal level or had observed these with family or friends. For students, these coping strategies were used for both direct and indirect effects of COVID-19 (e.g. isolation, studies at home). Self-blame however was predominantly indirectly related to COVID-19.

Students that accepted their situation early experienced less anxiety sooner. This acceptance was dependant not only on financial and social support, but also influenced by personality. In comparison, Desclaux, Badji [33] showed that acceptance was improved by moral, economic, and social support. Students that educated themselves about the virus early also accepted the situation sooner. This link between the level of knowledge and anxiety has been established in previous studies. Lehmann, Bruenahl [34] found that the best predictors of poor physical and mental health of healthcare workers were due to a perceived lack of knowledge about the Ebola virus during the outbreak. In contrast, Loh, Ali [35] found that medical students who had less knowledge about SARS experienced higher levels of anxiety than medical students with more knowledge.

Almost all students found the first few weeks after the outbreak chaotic and noted that the transition to online learning and working from home was difficult. The main difficulties for students in this study were uncertainty, getting into a routine, not having face-to-face tutorials to help understand the theory, and not learning with others, or getting support 'face-to-face'. Online support is was also found in other studies to be limited compared to 'face-to-face' consultations [16]. Personality and learning style also played a role in how students coped which is congruent with other studies [36,37].

Although students were communicating regularly, 4 of the 17 students felt that they did not have as much social support as a result of COVID-19 and stated that they were not coping. These students also reported higher anxiety and poorer habits, such as reduced sleep and exercise. Xiao, Zhang [13] found that during the spread of COVID-19 in China, levels of social support for medical staff were significantly associated with self-efficacy and sleep quality and negatively associated with the degree of anxiety and stress. Levels of anxiety were significantly associated with the levels of stress, which negatively impacted self-efficacy and sleep quality. That is, anxiety, stress, and self-efficacy are mediating variables associated with both social support and sleep quality. For most students, they still communicated with the important people in their lives, but the way they communicated was different.

Our study found that since the outbreak students were most worried about one of three things: family and vulnerable relatives, how their

studies were being affected, and the uncertainty about returning to 'normal', the first being the most frequent concern. This major concern was echoed in a study investigating the effects of the H1N1 pandemic on healthcare workers, where the most frequent concern was the infection of family and friends and the health consequences of the disease [38]. Many students took up positive rather than negative habits during isolation, although students did take time to accept what was happening, establish a routine, and take up these positive habits. This type of response was also found by Yang, Hutchinson [39] who found that students who previously felt uncomfortable participating in physical activities started exercising because of more welcoming atmospheres and an emphasis on quality of life.

Encouragingly, almost all students had no second thoughts about continuing to study to become a paramedic since the outbreak and stated that they had already come to terms with the danger in the role during their degree. Only 2 students out of 17 were concerned about undertaking clinical placements, but this was primarily based on the fear of contracting and passing on the disease to others. Students also had an opinion that they were fit and healthy and were unlikely to contract COVID-19 if they followed precautions, and if they did contract it, they would be fine. This opinion was similarly a result of Seale, Mak [40] study that found both domestic and international students believed that they were capable of fighting off any illness and were not at risk of catching pandemic influenza. Future strategies identified by students emphasised the need to experience coping strategies over being told about them. These future strategies suggested by students will be a good starting point for future research.

5. Research limitations

Our research had typical limitations associated with self-reported questionnaires, content analysis, and studies where people choose to participate. First, with self-reported questionnaires, there is a possibility of providing answers that are not valid due to untruthful answers. We chose commonly used standardised instruments Second, the limitation often highlighted with content analysis is that the researcher conducting the analysis can ignore the context that the categories and words are within. To counteract this, we ensured that the researcher who conducted the interviews also conducted the analysis. Lastly, in both the questionnaires and in-depth interviews, students chose to participate and therefore non-responsive bias is also another limitation. For example, our in-depth interviews did not include any students that had deferred. We did however cross-check for similarities in the socio-demographic information between the students that participated and the paramedicine student population overall. We also had a poorer response rate for the questionnaires than we anticipated, but this is perhaps a sign of the circumstances the students found themselves in as a result of COVID-19 restrictions attending the university campus. We had good representation across the years for both questionnaires and interviews.

6. Conclusion

A large proportion of paramedicine student responders reported above normal levels of anxiety in the initial stages of the COVID-19 outbreak. Most students, with the help of learning, financial and social support, and a range of positive coping strategies, have adapted well to the impact of the outbreak. The transition to online learning has been most difficult for 1st-year students, rural students, students not able to access financial support, and students not living at home with parents. Students that accepted the situation sooner and adopted positive habits during isolation (e.g. regular exercise, good sleeping and eating habits, forms of relaxation) have been able to reduce their anxiety and stress. Future strategies identified by students they believe will help them cope now and moving forward are experiencing coping strategies over being told about them, being more proactive than reactive about services and strategies available, developing critical thinking skills to create and choose strategy options from a toolkit, learning from in-depth stories and case studies, and also ensuring minority groups are represented and considered throughout these strategies. Although this study explored the anxiety levels and coping strategies of paramedicine students during COVID-19 restrictions, and their perceptions on how to improve their coping strategies; these findings are likely to be applicable to other health care students, such as nursing and or medical students and post registration students in emergency care specialist training position. The future strategies and interventions suggested also show potential in informing learning, teaching and pastoral care across the health disciplines, and are a good starting point for future research.

CRediT authorship contribution statement

Brett Williams: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Writing - original draft, Writing - review & editing, Supervision, Project administration. **Christine King:** Software, Validation, Formal analysis, Investigation, Writing - original draft, Writing - review & editing. **Brendan Shannon:** Formal analysis, Investigation, Resources, Writing - original draft, Writing - review & editing. **Cameron Gosling:** Methodology, Software, Formal analysis, Investigation, Data curation, Writing - original draft, Writing - review & editing.

Declaration of Competing Interest

The authors declare no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

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