

**An overview of current mental health in the general population of Australia during the
COVID-19 pandemic: Results from the COLLATE project**

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Abstract

The novel coronavirus disease (COVID-19) poses mental health challenges globally; however, to date, there is limited community level data. This study reports on the COLLATE project (COvid-19 and you: mentaL heaLth in AusTralia now survEy), an ongoing study aimed at understanding the impact of the COVID-19 pandemic on Australian mental health and well-being. We addressed prevailing primary concerns related to the COVID-19 pandemic, current levels of negative emotions and risk factors predicting negative emotions. On April 1st to 4th 2020, 5158 adults from the general public completed an online survey. Participants ranked their top ten current primary concerns about COVID-19, and completed standardized measures of negative emotions. The top three primary concerns were related to health and well-being of family and loved ones. Levels of negative emotion were high. Modelling of predictors of negative emotions established several risk factors related to demographic variables, personal vulnerabilities, financial stresses, and social distancing perceptions; particularly being young, female, or having a mental illness diagnosis. The data provides important characterization of the current Australian mental health. It appears that specific groups may need special attention to ensure their mental health is protected. These results may provide direction for international researchers characterizing similar issues.

Keywords: COVID-19, general population, mental health, negative emotions

1. Introduction

The novel coronavirus disease (COVID-19) emerged in China in late 2019 and has spread rapidly across the globe. It is a contagious viral infection presenting with respiratory, neurological, gastrointestinal, and cardiac symptoms that range in severity from non-symptomatic through to causing death (Mao et al., 2020). Australia's first case reported symptoms on January 13th 2020 (2019-nCoV National Incident Room Surveillance Team, 2020). This was followed by an exponential increase in infections, and unfortunately, deaths (first Australian death occurred on February 24th). Since COVID-19 was declared a pandemic by the World Health Organization (WHO) on March 11th 2020 (WHO, 2020), the world has been engulfed in an unprecedented global crisis characterized by threatened or actual healthcare system collapse, job losses, and a failing global economy. In Australia, the crisis has been compounded by the implementation of government-regulated restrictions to contain the virus affecting social liberties.

In Australia, several health and economic measures had been implemented by March 31st 2020, in an attempt to control the spread of COVID-19 and stave off economic recession (e.g. \$130b towards keeping Australians employed). While a recent funding announcement of \$1.1b to boost digital mental health services is welcome, if we are to adequately manage this COVID-19 mental health crisis, there is a time-critical need to empirically characterize the initial psychological impacts of the pandemic on the Australian population. This is particularly relevant given the Australian Government's current implementation of 'social distancing', a key transmission-prevention measure that describes the maintenance of minimum physical space between oneself and those outside of one's home. Social distancing restrictions, which limit one's out-of-home movements unless absolutely essential, have been found to increase social isolation and loneliness (Zhang et al., 2020), alcohol abuse (Wu et

al., 2008), and domestic violence (Galea, Merchant, & Lurie, 2020). This could translate to widespread fear, anxiety, and depression in general society, particularly exacerbated in persons with existing mental health conditions who have an increased susceptibility to the adverse impacts of stress (Duan & Zhu, 2020).

In light of this, COVID-19 poses a significant mental health challenge to the Australian population, both now and in the long term. At the time of commencing this project there was no community level data in relation to the mental health implications of the COVID-19 pandemic in Australia, and only one published study from another Western country. In that study of 1310 adults in Spain, heightened negative emotions were associated with being female, being younger, and having negative self-perceptions (Losada-Baltar et al., 2020). Four studies on the psychological impacts of COVID-19 have emerged from China after we commenced this project. One study analyzed Weibo (Chinese social media platform) posts from 17,865 active users using online ecological recognition based on machine-learning predictive models (Li, Wang, Xue, Zhao, & Zhu, 2020). The results showed that negative emotions increased (e.g., anxiety, depression and indignation), while positive emotions (e.g., happiness) and life satisfaction decreased over a two-week period from January 13th to January 26th 2020. Two other studies compared the psychological status of medical and non-medical (administration) health workers, illustrating increased insomnia, fear, anxiety, depression, somatization, and obsessive-compulsive symptoms in medical health workers (Lu, Wang, Lin, & Li, 2020; Zhang et al., 2020). Living in rural areas, being female, and being in contact with COVID-19-positive patients were reported as risk factors for negative emotions. Wang et al. (2020), using an online survey and snowball sampling in the general population between January 31st and February 2nd 2020, reported that ~50% of the 1210 respondents rated the psychological impact of COVID-19 as moderate-to-severe, with 33%

reporting moderate-to-severe anxiety. Student status, being female and poor self-rated health were reported as risk factors for negative emotions. Further studies have been published at a rapid rate internationally, including for example the USA and Canada (Klaiber, Wen, DeLongis, & Sin, 2020; McGinty, Presskreischer, Han, & Barry, 2020; Taylor, Landry, Paluszek, & Asmundson, 2020), Europe (Perez, Masegoso, & Hernandez-Espeso, 2020) and Japan (Kikuchi et al., 2020).

We report on the first wave of data collected from the COLLATE project (COvid-19 and you: mentaL healTh in AusTralia now survEy), an ongoing study aimed at understanding the impact of the COVID-19 pandemic on the mental health and wellbeing of Australians. On 31st March 2020, Australia was at Stage 3 activity restrictions, with Australians told to stay at home except for four reasons - food and essential supplies, medical attention, exercise (one hour per day), and work and study if cannot do so remotely. The first COLLATE survey was launched the following day, 1st April 2020. The COLLATE project (described below) focuses on identifying the current concerns, emotional experiences and risk factors for adverse COVID-19-related mental health outcomes in people currently living in Australia. In our initial analysis of wave 1 data, we focused on characterizing the primary concerns of respondents related to the current COVID-19 pandemic as of April 1st to 4th 2020. Levels of negative emotion (depression, anxiety, and stress) were examined and compared with existing Australian population norms; and were modelled as an outcome to identify possible risks factors related to demographic variables, personal vulnerabilities, financial stresses, and social distancing perceptions.

2. Methods

This study received ethics approval from Swinburne University Human Ethics Review Committee (approval number: 20202917-4107) and complied with the Declaration of Helsinki.

2.1 Study Design and Population

On April 1st 2020, adult members of the Australian general public (aged 18+) were invited to participate in an anonymous ~15-20mins online survey, completed at their convenience (i.e. the inclusion criteria to participate were being aged 18+ years and currently residing in Australia). Participants were informed that 16 surveys would be issued over the course of the project. These would be active for 72 hours per month, from 9am on the 1st to 8:59am on the 4th (Australian Eastern Standard Time), occurring monthly for the first year and then annually for the subsequent four years (Tan et al., 2020). Participants were informed that they could complete as many or as few surveys as they wanted, with surveys from the same respondent being linked by a personalized pseudonym (thus a subsample would provide us with longitudinal data, with the remaining data cross-sectional snapshots over the 16 surveys).

Invitations to complete the survey were placed on digital university and community noticeboards and social media (e.g. Facebook, LinkedIn, Instagram, and Twitter) as well as participant registries held within the Centre for Mental Health at Swinburne University, which included participants with identified mental health conditions. In addition, **exponential non-discriminative snowball sampling** was used, with all participants asked to pass the invitation onto their networks. Participants were not reimbursed for completing the survey.

After online consent, participants completed the survey which covered three broad topics: a) current concerns, b) current emotional experiences, and c) socio-demographics/risk factors. Items from previously validated surveys were incorporated where possible, in line with good practice in survey creation (Thayer-Hart, Dykema, Elver, Scaeffler, & Stevenson, 2010). Relevant existing scales and measures were included if they had good reliability/validity. Demographic items were included based on examinations of other large-scale Australian surveys (including the Household, Income and Labor Dynamics in Australia (HILDA) Survey, the National Drug Strategy Household Survey and the Domestic and Family Violence Survey, the Australian Bureau of Statistics National Health Survey) additional items were created where necessary to ensure that all areas of interest were covered. In terms of item structure, many of the demographic questions were multiple choice or check box options. For more exploratory items, open ended questions with text boxes for responses were provided. As noted, the data described here relate to survey round 1: April 2020, and only the measures addressing our aims for this manuscript are described below.

2.2 Measures

Primary concerns: Participants were asked to identify and rank their top 10 current concerns (out of 23) relating to the COVID-19 pandemic, with 1 being their greatest concern (see Table 2 for the full list of concerns).

Negative emotions: The Depression Anxiety Stress Scale (DASS-21) was used. It is a 21-item self-report measure yielding three subscales – depression, anxiety, and stress – each containing seven items (Lovibond & Lovibond, 1995). Sample items for each of the subscales are as follows: depression - “I felt that life was meaningless”; anxiety - “I was aware of dryness of my mouth” and stress “I found it hard to wind down”. Individual items

are scored on a four-point Likert scale (0 to 3). DASS-21 raw scores were doubled to render them comparable to full-length DASS scores (42 items). DASS-21 possesses good internal consistency across the subscales and overall scale ($\alpha > .81$), and convergent and discriminant validity has been established (Henry & Crawford, 2005). In the current study, the reliability of the overall scale was excellent ($\alpha = .939$). In addition, the Depression, Anxiety, and Stress subscales each had good reliability ($\alpha = .907, .841, \text{ and } .878$, respectively).

Risk factors: Measurement of risk factors were divided into four categories: *Demographics* including: age, gender, education, living situation, geographical location/state, whether born in Australia, ethnicity, and religion; *Personal vulnerabilities* including: being someone at increased mortality risk (e.g. immune-compromised, >60years), having lived experience of mental illness, being a carer of someone with a mental illness or special needs, and being a healthcare professional or ‘essential’ worker; *Financial stresses:* fortnightly take-home pay, cash savings, mortgage repayments/rent, self-employment, job loss, and occupation; *Social distancing perceptions:* perceived positives of the situation, perception of government restrictions on mental health, perception of social distancing measures duration, and working from home.

2.3 Statistical Analyses

Data were analyzed in *SPSS v26.0*. The recruitment advertising for COLLATE created biases and did not allow for a representative Australian sample, thus for all analyses, weights were used to adjust for imbalances in the sample based on the Australian Bureau of Statistics (ABS) population data for age, gender and geographical location/state (ABS, 2016). In all, there were 12 categories for age (18-19; 20-24; 25-29; 30-34; 35-39; 40-44; 45-49; 50-54; 55-59; 60-64; 65-70; 70+), two categories for gender (male; female) and four categories for state (Victoria; New South Wales; Queensland; Australian Capital Territory + Northern Territory

+ Western Australia + South Australia + Tasmania). By March 31st 2020 23:59 Australian Eastern Standard Time (AEST) there were 4,707 confirmed cases of COVID-19 in Australia, with 18 deaths. The majority of confirmed cases were in the states of New South Wales (n=2,182), Queensland (n=743) and Victoria (n=917), with the other states and territories reporting a total of 865 cases together. Given confirmed case numbers, we stratified by state by examining these three states independently from the other states and territories, which were combined.

Primary concerns: To characterize the top ten primary concerns, the number of respondents endorsing each concern was obtained and mean rankings were computed for the ten most commonly selected options. Rankings of zero were assigned to options not endorsed by a participant, and rankings of 1 to 10 were computed for endorsed concerns, with 10 for the option of greatest concern. In this case, the weights developed used the joint distributions of the three weighting variables ensuring that the sum of weights assigned was 5545 (i.e. the total number of respondents to this question who also provided age, gender and geographical location/state data).

Negative emotions: Depression, anxiety, and stress subscales and total DASS scores were compared to Australian population norms (Lovibond & Lovibond, 1995) using *t*-tests (to allow for multiple comparisons only p-values less than 0.001 were regarded as significant). The percentage of participants (weighted and non-weighted) were calculated across the four defined severity levels (normal, mild, moderate, severe/extremely severe) for the three negative emotions. Respondents who failed to complete more than 10% of the DASS items were removed from the analysis. Remaining missing items were imputed using the EM algorithm as Little's MCAR test showed items were missing completely at random. For this analysis, the sum of weights and sample size were equal to 5158.

Risk factors: Using a transformed (SQRT) total DASS, the relationships between negative emotions and the four domains (*demographics, personal vulnerabilities, financial stresses and social distancing perceptions*) were explored using general linear model analyses, to allow for multiple comparisons only p-values less than 0.001 were regarded as significant. The DASS scores were transformed to meet the homoscedasticity and normality assumptions of the general linear model analyses.

3. Results

Sample description

8014 participants started the survey, with $n=5545$ respondents (~30% attrition) completing the primary concerns ranking question and providing demographic data. For the negative emotion analyses $n=5158$ respondents completed the DASS. Demographic data is displayed in Table 1. The sample was biased in favour of females (80.9%) aged 25-44 (59.8%), with the majority living in the state of Victoria (61.8%), making the use of post-stratification weighting essential in subsequent analyses.

Insert Table 1 about here

Primary concerns: The primary concern data, with the percentage of respondents rating their top 10 concerns, is presented in Table 2. Mean rankings were ordered from 1 to 23 in declining order of importance (mean and standard deviations calculated for the rankings of each concern). “Implications for health and wellbeing of family loved ones” was the most commonly endorsed concern, however, it ranked 3rd in terms of mean rankings. “Loved one dying of coronavirus” and “Loved one catching coronavirus” were the next most commonly endorsed primary concerns, and had the highest mean rankings.

Insert Table 2 about here

Negative emotions: Figure 1 (also see Supplementary Table 1) shows mean values for the DASS scores compared to Australian norms. For all t-test comparisons they were significantly greater than the norms ($ps < .001$); with people self-identifying as having a mental health diagnosis (MH DX) scoring 5- 5.5-fold higher than those without such a diagnosis, who themselves scored 3 times higher than normative levels. Table 3 presents the score distributions across the four severity levels (normal, mild, moderate, severe/extremely severe); 21-35% of the population demonstrated moderate-to-extremely severe depression, anxiety and stress.

Insert Figure 1 about here

Insert Table 3 about here

Risk factors: *Demographics* – 18.7% of the variation in negative emotions was explained by demographic factors (Supplementary Table 2). Lower levels of negative emotions were demonstrated by: people aged 30-34 and 70+, males, people with higher levels of education, couples (with or without children), and non-Australian born residents. The two states with the most COVID-19 cases (i.e. New South Wales and Victoria) showed lower negative emotions than the other states and territories.

Personal vulnerabilities - Adding personal vulnerabilities to the initial model explained an additional 10.5% of the variation in negative emotions (Supplementary Table 3). People with a higher mortality risk, lived experience of mental illness, carer responsibilities for someone with a mental illness or special needs, as well as people in “essential” occupations, all had higher levels of negative emotions.

Financial stresses - Adding finance-related variables to the model explained an additional 5.2% of the variation (Supplementary Table 4). Individuals with higher fortnightly incomes and cash savings demonstrated lower levels of negative emotions. Higher levels of negative emotions were experienced by people under financial stress to meet mortgage and rental payments as well as those expecting to lose their jobs. Additionally, highest negative emotions were present for the unemployed, closely followed by homemakers, volunteers, or retired people.

Social distancing perceptions - An additional 8.4% of the variation was explained by adding social distancing variables (Supplementary Table 5). Generally speaking, higher negative emotions were recorded for those who found they now had more free time. This included those who had more down-time, more time to spend communicating with family, more time to do jobs around the house and for those who identified no positive influences in the current situation. However, negative emotions were lower for those who found they now had more time for hobbies. Negative emotions were higher for those who reported that the government restrictions were adversely impacting their mental health, and for those who thought that the current restrictions might continue for more than 12 months. Finally, negative emotions were higher for those not working from home.

Risk factor summary – The four domains explained 42.8% of the variance in negative emotions (summarized in Table 4). Important predictors for high negative emotions (i.e. $\eta^2 \geq 0.010$) were being young (18-24), being female, being single, living in states with lower COVID-19 cases (QLD, ACT, SA, WAS, TAS, NT), being at higher risk of mortality and having a lived experience of mental illness. The perceived negative effect of government restrictions on mental health was also highly associated with negative emotions, demonstrating the largest effect size, $\eta^2 = 0.102$. Having sizeable cash savings, owning one's

own home and predicting a short duration of the current situation were protective factors against experiencing negative emotions.

Insert Table 4 about here

4. Discussion

The first wave of data from the COLLATE project provides an important characterization of the current mental health of Australians during the COVID-19 pandemic. The top three primary concerns among the general public were all related to the health and well-being of family and loved ones, specifically loved ones catching or dying from COVID-19. As expected, levels of negative emotions (depression, anxiety and stress) were exceptionally high, approximately three times greater than existing population norms in those with no pre-existing mental health conditions (similar reports of elevated distress have emerged in Europe (Perez et al., 2020) and the USA/Canada (Klaiber et al., 2020; McGinty et al., 2020)). Of concern was the finding that those with a pre-existing mental health condition demonstrated negative emotions 5 to 5.5 times greater than population norms. When the current Australian DASS data was compared with Chinese data (Wang et al., 2020), two differences emerged. First, the mean total DASS score from China of 20.16 (SD 20.42) was lower than that of Australia, even for individuals not reporting a mental health condition (18-24years: 33.56 (SD 25.49) and 25years+: 22.29 (SD 16.90)). Second, more Australians were classified as having moderate-to-extremely severe negative emotions (see Table 3). These apparent cross-cultural differences will need to be further investigated with a specifically designed comparison study, with multiple factors including social norms, civil liberties, overall culture, current and historical experiences of adversity between the two countries being possible influences which need to be considered. Nonetheless, both the Australian and Chinese data

speak to the elevation of negative emotions in the general population during the COVID-19 pandemic.

In our data, modelling predictors of negative emotions established several risks factors related to demographic variables, personal vulnerabilities, financial stresses, and social distancing perceptions. This included young people (18-24 years) as well as those that are approaching middle-age (35-50 years). Given that the number of young people experiencing mental health conditions has been rising over the last decade in Australia (Carlisle et al., 2019), and internationally (Miron, Yu, Wilf-Miron, & Kohane, 2019), this current data of such high levels of negative emotions in young people (up to age 24 here) is of particular concern. Increased negative emotions in our middle-aged respondents were associated with increased childcare duties and/or financial stresses that are specific to the immediate situation. This speaks to the importance of monitoring negative emotions in both young people and the middle-aged group longitudinally, that is, in the short and long term.

Being female was another significant risk factor for high levels of negative emotions (Lu et al., 2020; Wang et al., 2020; Zhang et al., 2020). While possible reasons for this remain to be determined, we speculate this could relate to juggling work and increased childcare duties, heightened risk of being in a domestic violence situation, as well as the higher risks of job loss and/or higher likelihood of being an 'essential' worker. Those under financial strain and those who were unemployed are also at increased risk of psychological distress. Thus, methods for targeting this 'financial strain' population to offer them more affordable options for mental health support will be important.

Finally, those with pre-existing mental illness are of specific concern (Neill et al., 2020; Phillipou et al., 2020; Van Rheenen et al., 2020), and existing mental health services will likely need increased support to meet the rising needs of these consumers. It is notable that since this survey was conducted, the Australian government has announced a significant boost in funding to support mental health (\$76m over the next two years) with initiatives including dedicated websites and phone lines to support people experiencing stress and anxiety from prevailing COVID-19 related pressures, as well as a public information campaign. The current findings strongly underlie the need for such initiatives to be more targeted to specific groups.

Three other findings in our data warrant discussion. First, respondents from the two states with the highest number of COVID-19 cases, New South Wales (NSW) and Victoria, were found to have lower negative emotions. While this was unexpected, further examination of risk factors established there were a number of protective personal vulnerabilities and financial stresses for persons living in these two states. That is, these states encompassed a lower percentage of respondents with lived experience of a mental illness (38.5% for NSW and Victoria, and 41.4% for the other states combined) and a greater percentage of respondents with financial stability (for example, 71.6% of NSW and Victoria were currently employed, whilst only 64.1% for the other states, and 20.3% of NSW and Victoria had savings of >\$40,000 in comparison to 14.7% in the other states). Another important, albeit unsurprising, finding from our data was that individuals who perceived that current government restrictions were very negatively impacting their mental health also had the most pronounced negative emotions. In the context of respondents' primary concerns with the health and well-being of family members, this finding reinforces that government restrictions, such as social distancing, may be better be framed in public messaging as necessary for

protecting loved ones and ourselves from contracting the virus. Such a refocusing on positive outcomes may provide individuals with a sense of agency that tempers the powerlessness of being given a legal mandate to socially distance by staying at home. Another finding to discuss was the ranking (11 out of 23) of personal finances in our concerns data (Table 2), and that financial stresses explained ~5% of the variance in negative emotions. That is, demonstrating both our ranking data and risk factor analyses only found a low/moderate impact of finances in Australia in comparison to the other concerns and risk factors we investigated. These data may in part be explained by a stable economy and universal health care in Australia. Given large variances across nations in terms of economy and healthcare, alternate weighting of financial concerns would be expected in different countries.

A limitation of the study was the snowballing approach to survey recruitment; this resulted in a non-representative sample of the Australian population, which included some respondents with known mental health diagnosis. To address this, weightings were used based on ABS data (ABS, 2016) to statistically correct for any bias. However, even with statistical weighting, it is difficult to account for specific subgroups, for example those without access to the internet. Furthermore, despite >8000 participants starting the survey, only ~5500 had useable datasets due to considerable attrition (30%), which is albeit typical of online research. This data provides a snapshot of mental health and well-being of Australians in April 2020 in relation to COVID-19; to do so we compared current negative emotions to existing Australian norms. It is possible differences in sampling factors related to the current sample data and existing norms may explain some of the differences rather than COVID-19 itself. However, given the magnitude of our findings in terms of elevated negative emotions in the general community such sampling differences are unlikely to explain the large variance between current and norm data. As noted in Table 2, media coverage of the pandemic was ranked 19 out of the 22 concerns, that is, a low ranking. However, we did not explicitly ask

about the either amount exposure to media or social media, given recent reports that media exposure may have a direct influence on negative mood (Liu & Liu, 2020), it is a limitation that we could not investigate this influence in our models.

4.1 Conclusion

The data collected from the COLLATE project will provide a reference for healthcare professionals in terms of current mental health needs in Australia, in addition to guiding policymakers in making accurate provisions within mental health services and actionable policies. The findings are predicted to be applicable across other nations with similar healthcare systems and government management of the COVID-19 pandemic. Important findings from the data are that: a) people with existing mental health conditions have very high levels of negative emotions (as per (Duan & Zhu, 2020)) , in addition, there are b) high levels of psychological distress in the general community, with some individuals particularly vulnerable (as per (Wang et al., 2020)). Recognizing and acknowledging such high levels of negative emotions and distress in the general population at the juncture may assist with normalizing these experiences. The fluid nature of the situation throughout this pandemic makes our continuing and longitudinal comparisons of the mental health effects of government and social distancing restrictions a priority for future study. Overall, this data has made it clear that increased mental health support will be of paramount importance as the world faces the consequences of the COVID-19 pandemic.

Authorship

SLR conceived the project and the design. All authors SLR, DM, EN, AP, EJT, WLT and TVR finalized the design, constructed the survey, obtained ethics, engaged in data collection and interpretation of findings. DM completed all the data analyses in consultation with the other authors. All authors prepared the manuscript and agreed to its final form.

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Conflict of Interest Statement

The authors have declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

Data sharing: The dataset is available on request by qualified researchers/scientists.

Requests require a concept proposal describing the purpose of data access, appropriate ethical approval, and provision for data security. All data analysis scripts and results files are available for review.

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Table 1: Sociodemographic description of the sample

Legend: Australian Capital Territory – ACT; South Australia – SA; Western Australia – WA; Tasmania – TAS; Northern Territory – NT; New South Wales – NSW; Victoria - VIC; Queensland – QLD.

Table 2: Rank data illustrating the ten primary concerns endorsed by Australians (N= 5545)

Legend: ^ Analyses weighted to adjust for imbalance in the sample of respondents based on Australian Bureau of Statistics (ABS)(ABS, 2016) population data for age, gender and geographical location (State). # Rankings of zero were assigned to options not endorsed by a participant and, for endorsed concerns, rankings of 1 to 10 were computed, with 10 for the option of greatest concern. ~ Black text = Top ten concerns in rank order, Grey text = Remaining thirteen concerns in rank order.

Table 3: DASS scores across the severity levels in the current Australian data from COLLATE in comparison to the Chinese data from Wang et al. (Wang et al., 2020)

Legend: Aus W = Australia weighted data, Aus NW = Australia non-weighted data; Depression: normal (score: 0-6), mild (score: 10-12), moderate (score: 13-20), severe/extremely severe (score: 21-42); Anxiety: normal (score: 0-6), mild (score: 7-9), moderate (score: 10-14), severe/extremely severe (score: 15-42) and Stress: normal (score: 0-10), mild (score: 11-18), moderate (score: 19-26), severe/extremely severe (score: 27-42). Scores as per Lovibond & Lovibond (Lovibond & Lovibond, 1995), it should be noted that DASS is not a categorical measure of clinical diagnosis, for clinical purposes it can be helpful to have ‘labels’ to characterize degree of severity relative to the population.

Table 4: R-Square values and most important predictor variables for negative emotions

Legend: All selected predictors with partial effect sizes $\eta^2 \geq 0.010$

Figure Legend

Figure 1: Comparison of weighted sample results with existing Australian norms for the DASS-21

Legend: Norms in Australia from Lovibond & Lovibond (Lovibond & Lovibond, 1995), MH = Mental Health

Supplementary material

Supplementary material for this article is available online.

Table 1: Sociodemographic description of the sample

Demographic Variables		Primary Concerns Analyses		Negative Emotion and Risk Factors Analyses	
		N	%	N	%
Age (years)	18-19	82	1.5	77	1.5
	20-24	436	7.9	397	7.7
	25-29	927	16.7	852	16.5
	30-34	894	16.1	806	15.6
	35-39	785	14.2	731	14.2
	40-44	630	11.4	592	11.5
	45-49	497	9.0	472	9.2
	50-54	405	7.3	383	7.4
	55-59	266	4.8	257	5.0
	60-64	288	5.2	274	5.3
	65-70	183	3.3	177	3.4
	70+	152	2.7	140	2.7
	Gender	Male	958	17.3	896
Female		4483	80.8	4172	80.9
Other		104	1.9	90	1.7
Highest Education	Postgraduate	1744	31.8	1642	31.8
	Undergraduate	2275	41.5	2152	41.7
	Diploma/ Certificate	956	17.4	889	17.2
	High School	511	9.3	475	9.2
Living situation	Single person living alone	693	12.8	664	12.9
	Non-related adults sharing a home	454	8.4	428	8.3
	Couple living with no children	1384	25.6	1318	25.6
	Couple with dependent children living at home	1597	29.6	1523	29.6
	Single parent with dependent children living at home	267	4.9	260	5.0
	Single person living with extended family (with or without children)	354	6.6	331	6.4
	Couple living with extended family (with or without children)	221	4.1	214	4.2
	Other	434	8.0	415	8.1
Geographical location / state	ACT, SA, WA, TAS, NT	665	12.0	621	12.0
	NSW	1028	18.5	955	18.5
	VIC	3489	62.9	3239	62.8
	QLD	363	6.5	343	6.6
Born in Australia	Yes	4211	75.9	3917	78.5
	No	1148	20.7	1070	21.5

Legend: Australian Capital Territory – ACT; South Australia – SA; Western Australia – WA; Tasmania – TAS; Northern Territory – NT; New South Wales – NSW; Victoria - VIC; Queensland – QLD.

Table 2: Rank data illustrating the ten primary concerns endorsed by Australians (N= 5545)

Concern [^]	Order Mean Ranks	Mean Rank#	SD Rank #	% Top 10 Rankings	Order Top 10 Ranks
Loved one dying from COVID-19	1	6.41	4.09	77.75	2
Loved one catching coronavirus	2	5.40	3.91	73.13	3
Implications for health and wellbeing of family/loved ones	3	5.27	3.20	82.36	1
Implications for health and wellbeing of society	4	3.48	3.19	67.57	4
Catching COVID-19 myself	5	3.43	3.62	58.95	7
Implications for health and wellbeing of self	6	3.32	3.28	61.61	6
Dying of COVID-19 myself	7	2.98	3.79	47.56	11
Social isolation and social distancing~	8	2.98	3.22	57.05	8
Australian economy	9	2.83	2.94	62.68	5
Risk of unemployment or reduced employment	10	2.63	3.52	44.35	13
Personal finances	11	2.21	3.07	45.89	12
Access to appropriate medical care	12	2.11	2.75	47.60	10
Availability of food and medicines	13	2.10	2.63	51.20	9
World economy	14	1.75	2.61	43.33	14
Balancing work & caring for children/dependents	15	1.25	2.76	20.98	17
The rapidly changing landscape	16	1.24	2.35	29.60	15
Travel restrictions	17	1.21	2.30	28.87	16
Government communication of key messages	18	0.91	2.09	20.76	18
Media coverage of the pandemic	19	0.69	1.83	17.92	19
Domestic violence	20	0.66	1.80	15.53	21
Adapting to working from home (e.g. IT/connectivity issues)	21	0.64	1.80	15.61	20
Others	22	0.46	1.76	9.51	22
Not being able to attend regular place of worship	23	0.34	1.45	6.92	23

Legend: [^] Analyses weighted to adjust for imbalance in the sample of respondents based on Australian Bureau of Statistics (ABS)(ABS, 2016) population data for age, gender and geographical location (State). # Rankings of zero were assigned to options not endorsed by a participant and, for endorsed concerns, rankings of 1 to 10 were computed, with 10 for the option of greatest concern. ~ On 31st March 2020, Australia was at Stage 3 activity restrictions, with Australians told to stay at home except for four reasons - food and essential supplies, medical attention, exercise, and work and study if cannot do so remotely. The first COLLATE survey was launched the following day, 1st April 2020.

Black text = Top ten concerns in rank order, Grey text = Remaining thirteen concerns in rank order.

Table 3: DASS scores across the severity levels in the current Australian data from COLLATE in comparison to the Chinese data from Wang et al. (Wang et al., 2020)

		Depression			Anxiety			Stress		
		Aus W	Aus NW	China	Aus W	Aus NW	China	Aus W	Aus NW	China
Normal	N	2796	2521	843	3480	3058	770	2328	1870	821
	%	54.2%	48.9%	69.7%	67.5%	59.3%	63.6%	45.1%	36.3%	67.9%
Mild	N	752	810	167	402	439	91	1730	1825	292
	%	14.6%	15.7%	13.8%	7.8%	8.5%	7.5%	33.5%	35.4%	24.1%
Moderate	N	922	1040	148	713	892	247	725	929	66
	%	17.9%	20.2%	12.2%	13.8%	17.3%	20.4%	14.1%	18.0%	5.5%
Severe/Extremely Severe	N	687	787	52	562	770	102	375	534	31
	%	13.3%	15.3%	4.3%	10.9%	14.9%	8.4%	7.3%	10.4%	2.6%

Legend: Aus W = Australia weighted data, Aus NW = Australia non-weighted data;

Depression: normal (score: 0-6), mild (score: 10-12), moderate (score: 13-20),

severe/extremely severe (score: 21-42); Anxiety: normal (score: 0-6), mild (score: 7-9),

moderate (score: 10-14), severe/extremely severe (score: 15-42) and Stress: normal (score: 0-

10), mild (score: 11-18), moderate (score: 19-26), severe/extremely severe (score: 27-42).

Scores as per Lovibond & Lovibond (Lovibond and Lovibond, 1995), it should be noted that

DASS is not a categorical measure of clinical diagnosis, for clinical purposes it can be helpful

to have 'labels' to characterize degree of severity relative to the population.

Table 4: *R*-Square values and most important predictor variables for negative emotions

Predictor Domains	Increase in R-Square	R-Square	Most important predictors
Demographics	18.7%	18.7%	Age ($\eta^2=0.099$) Gender ($\eta^2=0.027$) Living situation ($\eta^2=0.011$) State ($\eta^2=0.016$)
Personal vulnerabilities	10.5%	29.2%	Higher mortality risk ($\eta^2=0.020$) Lived experience mental health illness ($\eta^2=0.095$)
Financial stresses	5.2%	34.4%	Home rental stress ($\eta^2=0.012$) Level of cash savings ($\eta^2=0.012$)
Social distancing experiences	8.2%	42.8%	Effects of government restrictions ($\eta^2=0.102$) Expected duration of current situation ($\eta^2=0.010$)

Legend: All selected predictors with partial effect sizes $\eta^2 \geq 0.010$

Supplementary Material

Supplementary Table 1: Comprehensive comparison of weighted sample results with existing Australian norms for the DASS-21

	Australian Norms 18-24 years (1)	18-24 years No MH DX Nwt=410	18-24 years Previous MH DX Nwt=201	Australian Norms 25-90 years (1)	25-90 years No MH DX Nwt=3148	25-90 years Previous MH DX Nwt=1399
Depression	M 3·96 SD 4·52 Md 3 Range 0-20 Z-score 0	12·57 10·65 10 0·42 1·90	20·83 11·57 20 0·42 3·73	2·21 3·60 1 0·19 0	7·64 6·98 6 0·40 1·51	14·48 10·07 12 0·42 3·41
Anxiety	M 2·76 SD 3·52 Md 2 Range 0-15 Z-score 0	7·34 7·86 4 0·36 1·30	15·93 10·28 16 0·40 3·74	1·48 2·60 0 0·17 0	4·15 5·17 2 0·42 1·03	8·70 7·86 6 0·42 2·78
Stress	M 4·78 SD 4·71 Md 3 Range 0-21 Z-score 0	13·65 9·60 12 0·42 1·88	21·37 8·89 22 0·42 3·52	3·79 4·10 3 0·21 0	10·50 7·49 10 0·42 1·64	16·80 8·90 16 0·42 3·17
Total DASS	M 11·51 SD 11·51 Md 8·5 Range 0-54 Z-score 0	33·56 25·49 28 0-120 1·92	58·12 25·52 60 0-124 4·05	7·48 9·18 4 0·52 0	22·29 16·90 18 0-124 1·61	39·98 23·33 36 0-124 3·54

Legend: Norms in Australia from Lovibond & Lovibond (1), Nwt = weighted sample size,

M= mean, SD = standard deviation, Md = Median, MH = mental health, DX = diagnosis

Supplementary Table 2: Marginal means analysis describing negative emotions (SQRT transformed) in terms of demographics

Demographic Variables	Response Category	N	Nwt	%	Marginal Means	Std Errors	F-value	p-value	η^2
Age (years)							47.030	<0.001	0.099
	18-19	82	162	3.1	6.437	.182			
	20-24	436	449	8.7	5.970	.131			
	25-29	927	476	9.2	5.815	.125			
	30-34	894	491	9.5	6.146	.127			
	35-39	785	443	8.6	5.932	.127			
	40-44	630	445	8.6	5.865	.134			
	45-49	497	450	8.7	5.865	.137			
	50-54	405	427	8.3	5.433	.141			
	55-59	266	410	7.9	4.724	.138			
	60-64	288	362	7.0	4.622	.145			
	65-70	183	348	6.7	4.561	.135			
	70+	152	696	13.5	4.273	.119			
Gender							65.746	<0.001	0.027
	Male	958	2472	47.9	4.781	.051			
	Female	4483	2590	50.2	5.421	.054			
	Other	104	95	1.8	6.208	.249			
Highest Education							16.864	<0.001	0.011
	Postgraduate	1744	1578	30.6	5.151	.101			
	Undergraduate	2275	1974	38.3	5.507	.096			
	Diploma/ Certificate	956	991	19.2	5.721	.108			
	High School	511	614	11.9	5.502	.121			
Living situation							7.390	<0.001	0.011
	Single person living alone	693	751	14.6	5.641	.110			
	Non-related adults sharing a home	454	399	7.7	5.668	.134			
	Couple living with no children	1384	1567	30.4	5.281	.102			
	Couple with dependent children living at home	1597	1265	24.5	5.187	.107			
	Single parent with dependent children living at home	267	199	3.9	5.107	.166			
	Single person living with extended family (with or without children)	354	327	6.3	5.842	.143			
	Couple living with extended family (with or without children)	221	236	4.6	5.391	.155			
	Other	434	406	7.9	5.644	.135			
Geographical location / state							25.643	<0.001	0.016
	ACT, SA, WA, TAS, NT	665	1316	24.3	5.828	.102			
	NSW	1028	1739	33.7	5.252	.097			
	VIC	3489	1414	27.4	5.255	.109			
	QLD	363	689	14.6	5.546	.111			
Born in Australia							14.496	<.001	0.003
	Yes	4211	3649	73.7	5.595	.090			
	No	1148	1299	26.3	5.345	.102			

Legend: Nwt = weighted sample size partial effect sizes (η^2); $\eta^2=0.14$ for a large effect size, 0.06 for a moderate effect size; Australian Capital Territory = ACT; South Australia = SA; Western Australia = WA; Tasmania = TAS; Northern Territory = NT; New South Wales = NSW; Victoria = VIC; Queensland = QLD.

Supplementary Table 3: Marginal means analysis describing negative emotions (SQRT transformed) in terms of personal vulnerabilities

Personal Vulnerability variables	Response Category	Nwt	%	Marginal Means	Std Errors	F-value	p-value	η^2
A person at a higher mortality risk (at risk of death) for COVID-19? (e.g. immune compromised, >60 years old)						101.038	<0.000	.020
	No	3623	70.2	5.562	.098			
	Yes	1535	29.8	6.355	.109			
A person with lived experience of a mental illness						513.11	<0.000	.095
	No	3558	69.0	5.291	.100			
	Yes	1600	31.0	6.626	.100			
A carer of someone with a mental illness						9.759	.002	.002
	No	4702	91.2	5.808	.096			
	Yes	456	8.8	6.110	.117			
A carer of someone with special needs						12.212	<0.001	.002
	No	4880	94.6	5.748	.091			
	Yes	278	5.4	6.170	.131			
A health care professional						24.649	<0.001	.005
	No	4312	83.6	6.146	.094			
	Yes	846	16.4	5.772	.111			
A person with an essential occupation that requires them to leave home						8.977	0.003	.002
	No	4126	80.0	5.857	.097			
	Yes	1032	20.0	6.061	.106			

Legend: Nwt = weighted sample size, partial effect sizes (η^2); $\eta^2=0.14$ for a large effect size, 0.06 for a moderate effect size.

Supplementary Table 4: Marginal means analysis describing negative emotions (SQRT transformed) in terms of financial stresses

Financial stress variables	Response Category	Nwt	%	Marginal Means	Std Errors	F-value	p-value	η^2
Fortnightly take-home pay (AUD) before 1 st March 2020						5.340	<0.001	.008
	No personal income	341	6.7	6.579	.162			
	Less than \$1,000	485	9.5	6.444	.158			
	Less than \$2,000	849	16.6	6.872	.139			
	Less than \$3,000	1385	27.1	6.729	.134			
	Less than \$4,000	1070	20.9	6.667	.140			
	Less than \$5,000	578	11.3	6.884	.153			
	More than \$5,000	169	3.3	6.221	.190			
	Prefer not to say	241	4.7	6.957	.184			
Cash savings (AUD) on the 1 st March 2020						9.915	<0.001	.012
	Less than \$5,000	1834	35.9	6.837	.131			
	Less than \$10,000	513	10.0	7.021	.146			
	Less than \$20,000	402	7.9	6.736	.158			
	Less than \$30,000	255	5.0	6.227	.170			
	Less than \$40,000	228	4.5	6.840	.178			
	More than \$40,000	1095	21.4	6.435	.145			
	Prefer not to say	786	15.4	6.588	.146			
Mortgage Repayments (home)						28.736	<0.001	.006
	No	4579	88.8	6.432	.133			
	Yes	579	11.2	6.906	.143			
Mortgage Repayments (investment)						7.399	0.007	.002
	No	4958	96.1	6.479	.121			
	Yes	200	3.9	6.859	.171			
Rent (home)						57.865	<0.001	.012
	No	4476	86.8	6.340	.133			
	Yes	682	13.2	6.998	.142			
Self-employment						7.970	0.005	.002
	No	4593	89.0	6.542	.153			
	Yes	565	11.0	6.796	.165			
Lost job due to COVID19						11.699	<0.001	.007
	Yes	502	9.8	6.321	.157			
	No, but reduced hours	673	13.1	6.629	.145			
	No, but job loss is expected	353	6.9	7.136	.162			
	No	3602	70.2	6.591	.136			
Current Occupation						13.561	<0.001	.008
	Unemployed	570	11.2	7.028	.150			
	Student FT/PT	384	7.5	6.449	.164			
	Employed FT/PT/casual	3194	62.6	6.405	.131			
	Homemaker/volunteer/retired	953	18.7	6.794	.154			

Legend: Nwt = weighted sample size, partial effect sizes (η^2); $\eta^2=0.14$ for a large effect size, 0.06 for a moderate effect size.

Supplementary Table 5: Marginal means analysis describing negative emotions (SQRT transformed) in terms of social distancing experiences

Current experiences	Response Category	Nwt	%	Marginal Means	Std Errors	F-value	p-value	η^2
More time spent with family (any type of communication)						28.715	<0.001	.006
	No	2948	57.2	6.618	.138			
	Yes	2210	42.8	6.912	.142			
More 'down-time'						4.168	0.041	.001
	No	3103	60.2	6.707	.139			
	Yes	2055	39.8	6.823	.141			
More time for hobbies						4.055	0.044	.001
	No	3951	76.6	6.828	.136			
	Yes	1207	23.4	6.702	.144			
More time to get to jobs done around the house						15.437	<0.001	.003
	No	2713	52.6	6.654	.137			
	Yes	2445	47.4	6.876	.142			
No positives in situation						21.690	<0.001	.005
	No	4096	79.4	6.582	.134			
	Yes	1062	20.6	6.948	.150			
Effect of current government restrictions on mental health						139.950	<0.001	.102
	Very +ve	280	5.4	6.408	.169			
	Somewhat +ve	971	18.9	6.636	.144			
	Not at all	1103	21.4	5.781	.147			
	Somewhat -ve	2411	46.8	6.896	6.896			
	Very -ve	386	7.5	8.104	8.104			
How long will this continue?						11.828	<0.001	.010
	< 3 months	236	4.6	6.495	.175			
	< 6 months	1384	26.8	6.669	.141			
	< 12 months	1872	36.3	6.784	.141			
	> 1 year	1104	21.4	7.100	.143			
	No idea	551	10.7	6.777	.152			
Working from home?						4.250	0.039	.001
	Yes	2548	49.5	6.699	.136			
	No	2603	50.5	6.831	.145			

Legend: Nwt = weighted sample size, partial effect sizes (η^2); $\eta^2=0.14$ for a large effect size, 0.06 for a moderate effect size.

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