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REGULAR ARTICLE

Alcohol use in Australia during the early days of the COVID-19 pandemic: Initial results from the COLLATE project

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Aim: The effects of social isolation measures used to control the spread of COVID-19 are negatively impacting the mental health of many. One of the consequences of exposure to disasters/pandemics is an increase in alcohol use. The current study aimed to examine what predisposing (distal) and pandemic-related (proximal) factors were associated with increased drinking in the wake of the COVID-19 pandemic.

Methods: On 1 April 2020, 5158 Australians completed a survey from the COvid-19 and you: mentaL heaLth in AusTralia now survEy (COLLATE) project, a nationwide study aimed at tracking key mental health concerns. Using logistic regression, distal (demographics and previous drinking behaviors) and proximal (employment, lifestyle factors, and mood) factors were assessed for their association with increased drinking since the onset of the COVID-19 pandemic.

Results: Distal factors, including heavier drinking pre-pandemic, middle age, and average or higher income, and proximal factors, including job loss, eating more, changes to sleep as well as stress and depression, were all associated with increased drinking in the COVID-19 pandemic environment. Female sex and self-reported history of mental illness became nonsignificant after proximal measures were added to the model. Living alone, exercise, anxiety, and status as an essential or health-care worker were not associated with increased drinking.

Conclusion: These results provide guidance as to *who* might be targeted to receive support based on predisposing demographic factors and pre-pandemic drinking behavior. Second, they indicate *what* behaviors/factors accompany increased alcohol use and provide targets for psychosocial and psychoeducational supports to address these proximal factors.

Keywords: *alcohol, COVID-19, depression, mental illness, stress.*

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The novel coronavirus disease (COVID-19) has been rapidly spreading around the world since being first reported in China in December 2019. The first case in Australia was reported on 13 January 2020,[1] and the spread of the virus was determined to be a 'Public Health Emergency of International Concern' by the World Health Organization on 30 January.[2]

COVID-19 is a highly infectious contagion associated with respiratory, gastrointestinal, cardiac, and neurological symptoms, which in severe cases can lead to death. It represents the most deadly global pandemic seen since the Spanish flu in 1918.[3] In addition to the growing death toll, unprecedented economic damage globally, and the measures used to control its spread, the pandemic is having a significant negative effect on the behavior and mental health of those in affected countries (SL Rossell, E Neill, A Phillipou *et al*., pers. comm., 2020).

In Australia, severe social restrictions were put in place in an attempt to reduce transmission and ensure the health-care system could cope with the number of infected cases. These restrictions (strictest between the end of March and the beginning of May 2020) required that people stay home unless it was essential to go out (i.e., essential work or education, shopping for essential items, seeking medical care or caregiving, and exercise). People were asked to avoid interacting with others outside of their own household where possible and to maintain a social distance of 1.5 m from other people.[4] There is early evidence to suggest that the negative effects of COVID-19 are being felt in Australia in relation to both mental health (SL Rossell, E Neill, A Phillipou *et al*., pers. comm., 2020) and health-related behaviors.[5, 6]

One of the common methods of coping with stress, which can have a further negative effect on both physical and mental health, is excessive alcohol use.[7, 8] It is well known that alcohol use can increase during periods of disaster[9–12] and pandemic,[13, 14] and that alcohol use post-disaster does not necessarily return to normal levels over time.[8, 10, 15] Among the general population, Vlahov *et al*. found similarly increased levels of alcohol use 1 month and 6 months after the 9/11 terror attacks,[15] and DiMaggio *et al*. found that sustained high levels of alcohol use persisted 2 years post-9/11, even though psychological trauma had lessened by this time.[10] As such, there is evidence to suggest that an increase in alcohol use is likely to occur in difficult times and, importantly, it may remain at elevated levels without intervention. Therefore, it is important to examine alcohol misuse and identify associated risk factors for the COVID-19 pandemic so that education and intervention programs can be tailored for

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those who are likely to struggle with increased drinking during and after the COVID-19 pandemic.

To understand what factors are associated with increased alcohol use in the COVID-19 pandemic environment, it is necessary to examine two sets of variables: first, those that are pre-disposing or 'distal' risk factors; and second, those factors that relate to increased drinking during the pandemic, or 'proximal' factors.

Distal factors (pre-pandemic onset)

Demographics

Younger age was associated with heavier drinking after the 2004 Southeast Asia tsunami,[16] and the 2005 hurricanes Katrina and Rita.[17] Nordløkken *et al*. also found that living alone was associated with increased drinking[16] and, given the social isolation that has accompanied the COVID-19 lockdown, this effect may be compounded. In terms of sex, being male has often been associated with higher consumption of alcohol after a range of disasters (e.g. tornado and flooding).[16, 18, 19]

The relation between income and post-disaster drinking behavior is mixed, with studies reporting that lower income predicted more drinking following natural and terrorism-related disasters.[9, 17] In contrast, research from the severe acute respiratory syndrome (SARS) pandemic found that increased alcohol use was associated with higher incomes.[14] Income may thus be relevant, but its direction of action remains unclear.

Increased alcohol use post-disaster is described as an avoidant coping mechanism[20]; as such, predisposing factors that may impede an individual's ability to cope, such as prior history of mental illness, are likely to make them more susceptible to misusing alcohol in times of high stress.[8]

Drinking history

Evidence shows that individuals who drank heavily pre-disaster were also more likely to increase their drinking post-disaster.[11, 12] The Heslin *et al*. study found this to be true of US veterans exposed to the 1994 Northridge earthquake,[11] while the North *et al*. study found that this pattern of behavior manifested across 10 different types of disasters (including tornadoes, mass shootings, terror bombings, plane crashes, earthquakes, floods, and firestorms).[12]

Proximal factors (post-pandemic onset)

Employment

There is evidence that following disaster situations, life stressors, such as job loss, compound trauma and increase drinking.[17] The degree of exposure to threat has also been associated with higher post-disaster drinking levels. Data from the SARS pandemic found that hospital employees exposed to SARS had higher rates of alcohol use 3 years after the event.[14] Consumption was higher among those who were working in a high-risk location or who had been quarantined.

Lifestyle factors

Potential lifestyle factors of relevance in the COVID-19 pandemic include sleep, eating, and exercise behaviors as each has been associated with stress and alcohol use. Whether there will be significant increases or decreases in these behaviors/activities is not clear given the limited research in the disaster literature.[21, 22]

Mood

Finally, mood factors have been associated with an increase in alcohol use post-disaster, with higher rates of depression linked to greater alcohol intake during the SARS crisis.[14] Further, post-disaster, people reported drinking specifically to cope with their emotions.[12]

The current study

The current study aimed to examine the contribution of both distal and proximal risk factors to increased drinking during the COVID-19 pandemic.

In terms of distal factors, preliminary evidence from the COvid-19 and you: mentaL heaLth in AusTralia now survEy (COLLATE) data indicates that those with a self-reported history of mental illness are more likely to exhibit higher levels of depression, anxiety, and stress (SL Rossell, E Neill, A Phillipou *et al*., pers. comm., 2020).[6] This may contribute to misusing alcohol to cope.[20] Based on this and the previously cited findings, it was hypothesized that the following distal factors would be related to increased drinking: drinking above recommended levels pre-pandemic, younger age, living alone, male sex, and a history of mental illness.

In terms of proximal factors, previous papers using the COLLATE data indicate changes in eating and exercise behaviors in the general population during the COVID-19 pandemic[5] and increased negative mood in both the clinical and general populations (SL Rossell, E Neill, A Phillipou *et al*., pers. comm., 2020).[6] Based on this information and previous research, it was predicted that increased drinking would be associated with post-pandemic job loss, status as a health-care or essential worker, and higher levels of stress, anxiety, and depression. While there is evidence supporting relations among eating, exercising, sleep, and alcohol use, and between income and alcohol use, the directions of these relations are not clear, so no specific hypotheses were proposed.

Methods

To explore the factors that are associated with increased drinking in Australia after the outbreak of the COVID-19 pandemic, we report on the first wave of data collected from the COLLATE project. The COLLATE survey includes a broad range of measures aimed at assessing the mental health impact of the COVID-19 pandemic on the Australian population. Only measures of relevance to the research questions of interest here are detailed below. The study received ethical approval from the Swinburne University Human Research Ethics Committee (approval number: 20202917–4107) and complied with the Declaration of Helsinki.

Participants

On 1 April 2020, members of the Australian general public (aged 18 years and older), were invited to complete the online COLLATE survey. The survey was open for 72 h. Participants were recruited through non-discriminative snowball sampling using advertisements through social media, digital community noticeboards, participant registries held with Swinburne University, and email. Participants were informed that they were not obliged to complete the survey and that they could leave it at any time. They were also informed that by completing the survey, they were providing consent for their data to be used.

Measures

COVID-19-related alcohol use was assessed with the following question: 'In the past week, have there been any changes to the amount you are drinking?' Response options were: *Drinking a lot more than normal*, *Drinking a little more than normal*, *No change to how much I drink*, *Drinking a little less than normal*, and *Drinking a lot less than normal*. For the analysis, a binary variable was created to compare those who reported *No change* or any decrease in the amount they were drinking to those who were reporting *Drinking a lot more than normal*. Those reporting that they were *Drinking a little more* were excluded ($n = 1264$). This way, the findings were more likely to reflect a significant increase in alcohol use as opposed to small and potentially inconsequential changes.

Distal factors

Demographics

Males and females were compared. Participants were divided into four age groups: (i) a young age group between 18 and 24 years; (ii) a middle age group between 25 and 49 years; (iii) an older middle age group between 50 and 64 years; and (iv) an older age group of 65 years or older. Living situation included the following categories: *living alone*, *living in a share house*, *couple with no children*, *couple with children*, or *single parent*. Income was collapsed into a binary variable in line with categories defined by the Australian Bureau of Statistics[23]: below average fortnightly income (<$2000 AU) versus average or above income (>$2000 AU). Finally, an item was included in the survey that asked respondents whether they had any history of mental illness.

Drinking history

Information on drinking history was collected using the following item: 'Before the 1 March 2020, how many standard alcoholic drinks were you having a week?' Responses were: *I do not drink alcohol*, *Less than 10 standard drinks a week*, and *More than 10 standard drinks a week*. The distinction of less or more than 10 standard drinks a week was based on the most recent recommendations from the Australian government,[24] with >10 standard drinks above recommended guidelines.

Proximal factors

Employment

Two employment-related factors were included. The first related to jobs that increased potential exposure to COVID-19. Participants were asked to indicate if they were an essential worker (e.g., working in a supermarket, delivery driver) or a health-care worker (e.g., doctor, nurse, allied health professional, aged-care worker). Health-care workers and essential workers were each compared to those who did not endorse either of these items. The second factor included employment status post-pandemic onset, which was divided into four options: *No job loss*, *Reduced hours expected*, *Job likely to be lost*, and *Job lost*.

Mental health and lifestyle factors

Mental health was assessed by examining the Stress, Depression, and Anxiety subscales of the Depression, Anxiety, and Stress Scale (DASS-21) with higher scores indicating more severe symptoms.[25] Lifestyle factors were assessed using three items with one each assessing sleep, eating, and exercise. All three items asked about the behavior in the following format: 'In the past week, have you experienced any significant changes in your exercise/sleep/eating behaviors - more so than before the COVID-19 pandemic?' Respondents were asked to select one of the following: *A lot more*, *A little more*, *No change*, *A little less*, or *A lot less*. For analysis, this variable was collapsed into three categories: *A lot more*, *No change* or *A lot less*. Once again, this was to take out the influence of small changes and this meant that some respondents were excluded (those responding *A little less* or *A little more*).

Statistical analyses

SPSS Version 26 (IBM, Armonk, NY, USA) was used for all statistical analyses, with an alpha level of $P < 0.05$. DASS-21 scores were transformed to fulfill normality and homoscedasticity assumptions to reduce the impact of extreme cases. Binary logistic regression was performed to assess the impact of distal and proximal risk factors on self-reported increases in drinking after the onset of the COVID-19 pandemic. The first block of variables entered included distal risk factors (age, sex, living situation, income, history of mental illness, and previous drinking history). The second block consisted of proximal risk factors (COVID-19-related change in employment status; status as an essential or health-care worker; eating, exercise, and sleep behaviors; and the DASS-21 Stress, Anxiety, and Depression subscales).

Results

Descriptives

A total of 4462 individuals provided enough data to be included in the current analysis. Prior to the pandemic, 28% of the sample characterized themselves as non-drinkers, 10.5% described themselves as drinking >10 standard drinks a week, while 61.3% drank <10 standard drinks a week. After the pandemic onset, of those included in the analysis (not counting those who drank *A little more*), 69.2% reported either reduced or no changes to their drinking while 30.8% reported *Drinking a lot more than normal*. Table 1 lists the relevant predictor variables included in the regression. Females were overrepresented in the sample as were those aged 25–49 years.

Hypothesis testing

The effects of each variable entered at Block 1 and Block 2 on increased drinking are presented in Tables 2 and 3, respectively.

The Block 1 model was significant ($\chi^2 = 643.92$, d.f. = 15, $n = 4462$, $P < 0.001$, Nagelkerke pseudo $R^2 = 18.9\%$), with several distal factors significantly predicting increased COVID-19-related alcohol use. Compared to those aged 18–24 years, those aged 25–49 years had increased their drinking significantly more ($P = 0.04$) and those aged 65 years or older were less likely to report an increase in drinking ($P < 0.001$). There were no differences between the 18–24-years age group and those aged 50–64 years ($P = 0.57$). There was a significant effect of previous drinking history, with those who drank more pre-pandemic drinking even more post-pandemic onset ($P < 0.001$). Women reported consuming more drinks per week than men ($P < 0.001$), and there was a significant increase in drinking among those with a self-reported mental illness history ($P < 0.001$). There was no effect for income ($P = 0.20$) or living situation ($P = 0.44$).

Entering the Block 2 variables improved the model (Nagelkerke pseudo R^2 to 26.2%). This model had an area under the receiver–operator curve of 0.763 (95% confidence interval, 0.749–0.777), indicating an adequate fit for the data. Over and above the distal factors, *Eating a lot more than normal* was associated with increased drinking ($P < 0.001$). *Sleeping a lot less than normal* ($P < 0.001$) or *A lot more than normal* ($P < 0.001$) also predicted an increase in drinking. There was no significant effect for exercise ($P = 0.09$). There was an effect for employment ($P = 0.001$), with more individuals who had lost their jobs reporting an increase in drinking compared to those who had not ($P < 0.001$). There was no significant difference between those whose employment was unchanged and those with reduced hours ($P = 0.26$), or those who were concerned they would lose their jobs ($P = 0.38$). Higher levels for both the Depression ($P = 0.003$) and Stress ($P < 0.001$) subscales of the DASS-21 were significant indicators of increased drinking, but higher levels for Anxiety were not ($P = 0.44$). There was no significant effect for essential worker ($P = 0.18$) or health-care worker ($P = 0.17$) status.

After the Block 2 variables were added to the model, sex ($P = 0.18$) and self-reported mental illness history ($P = 0.96$) were no longer significant predictors of increased drinking, suggesting mediation effects by one or more of the proximal risk factors. The effect of age changed slightly, with the 18–24-years and 65-years or older age groups no longer different from one another ($P = 0.59$). The 18–24-years age group was less likely to report an increase in drinking compared to the 25–49-years ($P = 0.001$) and 50–64-years ($P = 0.008$) age groups. Finally, income became significant with those earning >$2000 AU per fortnight more likely to show increased drinking post-pandemic onset, compared to those earning <$2000 AU per fortnight.

Discussion

This study aimed to understand the distal and proximal factors that were associated with increased drinking following the COVID-19 pandemic.

Table 1 Factors in regression to predict self-reported increases in alcohol consumption

Domain	Variable	Levels	*N* (%) or Mean (SD)
Distal factors	Age (years)	18–24	474 (9.2)
		25–49	3453 (67.0)
		50–64	914 (17.7)
		65 plus	317 (6.1)
	Sex	Male	896 (17.4)
		Female	4172 (80.9)
	Household	Non-related adults	428 (8.3)
		Living alone	664 (12.9)
		Couple no children	1318 (25.6)
		Couple with children	1523 (29.5)
	Previous drinking	<10 standard drinks/week	3160 (61.3)
		Non-drinker	1453 (28.2)
		>10 standard drinks/week	540 (10.5)
	Take-home pay per fortnight	<$2000 AU	1485 (28.8)
		>$2000 AU	3477 (67.4)
	History of self-reported mental health condition	Yes	2014 (39)
		No	3144 (61)
Proximal factors	Lost job due to COVID-19	Yes	558 (10.9)
		Reduced hours	666 (13.0)
		Expected job loss	358 (7.0)
		No	3559 (69.2)
	Health-care worker[†]	Yes	967 (18.7)
		No	4191 (81.3)
	Other essential worker[‡]	Yes	1105 (21.4)
		No	4053 (78.6)
	Eating	A lot more	1788 (34.7)
		A lot less	270 (5.2)
		Same	3096 (60.1)
	Exercise	More	1815 (35.2)
		Less	2235 (43.3)
		Same	1106 (21.5)
	Sleeping	More	1502 (29.1)
		Less	2285 (44.3)
		Same	1367 (26.5)
	DASS-21	Depression	Mean = 11.35 (SD = 9.33)
		Anxiety	Mean = 7.36 (SD = 7.44)
		Stress	Mean = 14.77 (SD = 8.89)

[†]Health-care workers included doctors, nurses, allied health professionals, and aged-care workers.

[‡]Essential workers included those working in supermarkets and delivery drivers.

DASS-21, Depression, Anxiety, and Stress Scale.

Distal factors

As predicted, heavy drinking pre-pandemic was associated with increased COVID-19-related drinking. Both sex and history of self-reported mental illness were predictive in the first model, but became nonsignificant after proximal factors were added to the model. Contrary to expectations, living alone was not associated with increased drinking. Further, being aged 25–49 years, as opposed to being in the youngest age group (18–24 years), was associated with increased drinking. Finally, higher income was associated with increased drinking. These are discussed in turn below.

Sex and mental health

Sex and self-reported history of mental illness were significant predictors in the first model. A self-reported history of mental illness was, as expected, a significant predictor. Female sex was associated with an increase in drinking, contrary to expectations. Both sex and mental illness history became nonsignificant when proximal factors were added to the model. This suggests that the effect of mental illness and sex on drinking during the pandemic was mediated by the presence of magnitude of factors, including current psychological distress. This interpretation in relation to those with a history of mental illness is supported by the COLLATE study finding that those with mood disorders were scoring significantly higher on these measures.[6] In direct opposition to the hypothesis, it was also found that more women reported increased drinking than did men. This hypothesis was based on findings from natural disaster literature that were not associated with the lockdown element of the COVID-19 pandemic.[16, 18, 19] In lockdown, children were kept home and needed supervision and schooling from parents who were often also

Table 2 Results of the model predicting self-reported increased drinking for Block 1 distal factors

							95% CI for Exp. (B)	
	B	SE	Wald	d.f.	*P*-value	Exp. (B)	Lower	Upper
Age			48.86	3	**<0.001**			
25–49 years vs 18–24 years	0.30	0.14	4.29	1	**0.04**	1.35	1.02	1.78
50–64 years vs 18–24 years	−0.09	0.16	0.32	1	0.57	0.91	0.66	1.26
65 and over vs 18–24 years	−0.84	0.23	13.82	1	**<0.001**	0.43	0.28	0.67
Sex			11.89	2	**0.003**			
Female vs Male	0.30	0.10	9.89	1	**0.002**	1.35	1.12	1.63
Living situation			9.88	6	0.13			
Share house vs Living alone	0.23	0.15	2.49	1	0.11	1.26	0.95	1.68
Couple with no children vs Living alone	0.04	0.12	0.10	1	0.76	1.04	0.83	1.30
Couple with children vs Living alone	0.16	0.11	1.86	1	0.17	1.17	0.93	1.46
Single parent vs Living alone	0.05	0.18	0.08	1	0.78	1.05	0.74	1.50
Living with extended family vs Living alone	−0.24	0.17	1.96	1	0.16	0.78	0.56	1.10
Couple living with extended family vs Living alone	0.10	0.19	0.30	1	0.59	1.11	0.77	1.61
Previous drinking levels			364.13	2	**<0.001**			
Non-drinker vs >10 drinks per week	−2.11	0.12	331.99	1	**<0.001**	0.12	0.10	0.15
<10 drinks per week vs >10 drinks per week	0.36	0.10	12.20	1	**<0.001**	1.44	1.17	1.76
Average or above salary vs Below average salary	0.11	0.08	1.66	1	0.20	1.11	0.95	1.30
History of mental illness	0.31	0.07	17.64	1	**<0.001**	1.36	1.18	1.56

Significant *P*-values are set in bold typeface.

CI, confidence interval; SE, standard error.

attempting to work from home. This responsibility is still often carried more by women,[26] which may have contributed to increased stress leading to increased drinking in this group.

Living situation

In terms of living situation, data from a study of tsunami recovery found that living alone was associated with increased drinking post-event.[16] We hypothesized that in the current pandemic, the addition of social isolation posed a potential exacerbating factor for those living alone. Instead, the results showed that there were no differences between those living alone and all other groups. It is possible that pre-pandemic, those living alone were doing at least some of their drinking socially. As this option was not available during the social distancing restriction period, this may explain why their drinking did not increase substantially.

Age and income

While the literature suggested that younger age may be an important predictor, it was unclear exactly how it would contribute in the COVID-19 environment. The youngest age group (18–24 years) was less likely to report an increase in drinking than those aged 25–64 years. It may be that there are greater socioeconomic pressures (childcare, rent/mortgage repayments) in the 25–64-years age group and these may have contributed to their increase in drinking. The over-65-years age group was similar to the 18–24-years age group. It may be that those in the older age group may have had less disruption to their daily lives and finances than the middle age group.

Like age, income was also highlighted in the literature as a variable of interest,[9, 14, 17] but it was unclear whether less or greater income would predict increased alcohol intake. The results showed that an average or higher income was associated with increased alcohol use post-pandemic onset. Research has shown that drinking levels are higher among those on a higher salary in Australia,[27] potentially because they can afford to drink more. It may be that this trend may have continued on to higher drinking levels post-pandemic onset.

Proximal factors

In terms of proximal factors, it was predicted that disrupted lifestyle factors, negative mood, and loss of employment would predict increased drinking post-pandemic onset. As hypothesized, those who had lost their job as a result of COVID-19 reported drinking more than those who had not. Health behaviors, including eating a lot more than normal and both sleeping a lot more than normal and a lot less than normal were associated with increased drinking. Higher levels of depression and stress were associated with increased drinking as predicted, but anxiety was not related. Exercise behaviors did not predict increased drinking nor did status as a health-care or essential worker. These are discussed in turn below.

Mental health and lifestyle factors

While more general literature indicates that people report less or broken sleep post-disaster,[28] there is little information on the relation between lifestyle factors, such as sleep and eating, and alcohol use specifically in the post-disaster environment. In the COVID-19 situation, less sleep was associated with alcohol use and it might be that alcohol was used to help people try to get to sleep. It was also found that longer sleep was associated with increased alcohol intake. It is unclear why this occurred. It may reflect general disruption in routine (not having to get up to go in to work) and the stress of these changes might also have led to greater alcohol use. The association of more alcohol use being associated with more eating is in itself not surprising[29] and the current results demonstrate that these behaviors could have been triggered by the stress of the COVID-19 pandemic. Exercise was not a significant predictor in this case. This picture may be complicated by the fact that gyms were closed at this time, on the one hand, and by the fact that exercising was one of the few activities allowed outside the house, on the other hand. Further, research into the relation between exercise and alcohol use is complex, with factors like exercise intensity mediating this relation.[30]

Table 3 Results of the model predicting self-reported increased drinking for Block 2 proximal factors

							95% CI for Exp. (B)	
	B	SE	Wald	d.f.	*P*-value	Exp. (B)	Lower	Upper
Eating behavior			68.37	2	**<0.001**			
A lot more eating vs no change	0.59	0.08	56.68	1	**<0.001**	1.80	1.54	2.09
A lot less eating vs no change	−0.33	0.18	3.42	1	0.07	0.72	0.51	1.02
Exercise			4.80	2	0.09			
A lot more exercise vs no change	0.21	0.10	4.08	1	**0.04**	1.23	1.01	1.50
A lot less exercise vs no change	0.07	0.10	0.55	1	0.460	1.08	0.89	1.31
Sleep			21.83	2	**<0.001**			
A lot more sleep vs no change	0.37	0.11	12.45	1	**<0.001**	1.45	1.18	1.78
A lot less sleep vs no change	0.45	0.10	21.20	1	**<0.001**	1.56	1.29	1.89
Employment			15.45	3	**0.001**			
Job lost vs job retained	0.47	0.12	15.14	1	**<0.001**	1.60	1.26	2.03
Reduced hours vs job retained	0.12	0.11	1.25	1	0.264	1.13	0.91	1.40
Job loss expected vs job retained	0.12	0.14	0.76	1	0.38	1.13	0.86	1.49
Health-care worker	0.13	0.10	1.86	1	0.17	1.14	0.95	1.37
Essential worker	−0.12	0.09	1.79	1	0.18	0.89	0.74	1.06
DASS-21 Depression	0.02	0.01	8.90	1	**0.003**	1.02	1.01	1.03
DASS-21 Anxiety	−0.01	0.01	0.60	1	0.44	0.99	0.98	1.01
DASS-21 Stress	0.03	0.01	25.19	1	**0.001**	1.03	1.02	1.05

Significant *P*-values are set in bold typeface.

CI, confidence interval; DASS-21, Depression, Anxiety, and Stress Scale; SE, standard error.

Mood

In terms of negative mood, higher levels of depression and stress predicted increased drinking as expected. Contrary to expectations, anxiety was not a significant predictor. The Anxiety subscale of the DASS-21 examines feelings of panic/physical symptoms of anxiety. While alcohol can be used to relieve these symptoms,[31] it can also trigger them.[32] This may be particularly problematic for those experiencing panic/physical symptoms of anxiety, making alcohol use a less desirable coping strategy.

Employment

In this study, being a health-care or essential worker was not a significant predictor of increased drinking, which contrasts with earlier findings from the SARS pandemic.[14] For health-care workers, timing may be a factor in the current findings. This survey was completed between the 1 and 4 April, which was at the beginning of government restrictions. Case numbers were relatively low compared to those reported internationally at this time (around 300 cases reported daily in Australia at the time these data were collected).[33] Further, there is evidence that health-care workers within this dataset were not particularly stressed at this time (WL Toh, D Meyer, E Neill *et al*., pers. comm., 2020). However, these researchers also found that other essential workers were more stressed than both health-care workers and the general population. Why this did not translate into an increase in drinking is not clear. It may be that the ongoing requirement to attend work each day in a potentially risky environment made drinking a less attractive coping strategy. Additionally, in the early stages of the pandemic, food and goods hoarding was a significant issue and many essential workers worked overtime to keep up with demands, leaving them with less time to drink between shifts. Finally, being an essential worker is often associated with lower-paid positions (e.g., supermarket checkout or delivery driver). As such, they may have less income to spend on drinking.

Study limitations and strengths

Two inherent limitations of survey research are their reliance on self-report and that these data reflect a snapshot in time. The self-reported pre- and post-disaster drinking information in this study was general and subjective in nature. Further, the mental illness item asked about people's 'lived experience' of mental illness and, as such, clinical confirmation of diagnosis or symptom status was not ascertained. Further, the survey was designed to examine mental health broadly and not alcohol use specifically. As such, the alcohol use questions were not ideal and, as a result, some respondent responses (e.g., *A little more drinking*) were excluded from analysis. Finally, our sample consisted of many more women than men.

The strength of this study is that it included a large number of participants with over 5000 individuals responding to the survey. The timing of the first wave of the COLLATE survey provides a snapshot of the earliest stages of lockdown associated with the COVID-19 pandemic in Australia. Further, the survey design included a wide range of relevant variables, including comprehensive sociodemographic data along with information about lifestyle and mental health factors. This allowed for the inclusion of a broad range of relevant factors into the analysis.

The finding that women were drinking more (when proximal factors, including distress, are not controlled for) is of particular interest. More general disaster literature finds that it is men who drink more, but that literature does not take into account the lockdown aspect of the COVID-19 pandemic, which is complicated by the added pressures of managing child and home care. Further, similar research does not appear to have been conducted in previous pandemic research (e.g., SARS). This finding therefore highlights a new area of concern not previously considered. In addition to being relevant for the COVID-19 pandemic, future research examining disasters with associated lockdown should ensure that they take this issue into consideration. Further, there has been very little literature exploring the

relation between alcohol use and lifestyle factors, such as eating, sleeping, and exercise behaviors. This is one of the first studies to find significant associations in this context. Future research should consider investigating these relations in more detail.

In terms of the COVID-19 pandemic specifically, the results of this study are useful in two ways. In the first instance, they provide insight into who should be targeted to receive support based on predisposing factors. This includes people who were drinking heavily pre-pandemic, those in the average or higher income brackets, those aged 25–64 years, women, and those with a history of mental illness (among whom negative mood is exacerbated). Second, the results of this study reveal what behaviors/factors accompanied increased alcohol use. Using existing and modified psychosocial and psychoeducational supports and interventions for these behaviors/factors is recommended. Specifically, in addition to managing current stress and depression, interventions to improve sleep and to support good eating habits would be particularly important. This would be especially relevant for those who have lost employment. Ensuring that primary health-care providers are informed of the distal and proximal risk factors they need to look out for will be important in assisting them in directing clients that need additional support. Further, public awareness campaigns emphasizing the health consequences of problem drinking, in addition to acknowledging the at-risk groups and factors, is recommended.

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Disclosure statement

The authors have no conflicts of interest to disclose.

Author contributions

E.N. was responsible for the drafting of the manuscript. D.M. conducted the analysis and drafted the tables. S.L.R. conceptualized the project. All authors contributed to the design of the study, the acquisition of the data, and the refinement of the manuscript.

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