



# Patterns of suicide in the context of COVID-19: Evidence from three Australian states

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## Table of Contents

Summary .....	4
Introduction .....	7
Method .....	8
Results.....	11
Discussion.....	14
References .....	19

## Summary

- We pooled data from the interim Queensland Suicide Register (iQSR), the Tasmanian Suicide Register (TSR) and the Victorian Suicide Register (VSR) to examine patterns of suicide in the context of COVID-19.
- Data included suspected suicides occurring in the 37 months before (1<sup>st</sup> January 2017-31<sup>st</sup> January 2020) and the seven months after (1<sup>st</sup> February 2020-31<sup>st</sup> August 2020) the first cases of COVID-19 were identified in Australia.
- Using real-time suicide data, we ran multiple unadjusted and adjusted interrupted time-series analyses to ascertain whether trends in monthly suicide counts changed after the pandemic began and whether there had been an increase in suicides where relationship breakdown, financial stressors, unemployment, and homelessness were recorded by police as likely contributing factors to the suicide.
- Over the entire study period there were 5,791 suicides recorded across Queensland, Tasmania and Victoria. Males accounted for 75.4% of these suicides and the majority occurred among people aged 25-64 years (70.5%).
- Of the four risk factors for suicide examined in this study, relationship breakdown was the most frequently recorded by police. There were 1,336 cases of suicide for which relationship breakdown was recorded (23.1%), 442 cases for which the presence of financial stressors was recorded (7.6%), 361 for which unemployment was recorded (6.2%), and 90 for which homelessness was recorded (1.6%).
- Compared with the period before COVID-19, during the COVID-19 period there was no change in the number of suicides overall (unadjusted RR 0.99 [95% CI 0.92-1.06]; adjusted RR 1.10 [95% CI 0.93-1.32]), or in most stratum-specific estimates. However, the number of young males who died by suicide during the COVID-19 period was higher than the expected number based on the adjusted model (adjusted RR 1.89 [95% CI 1.11-3.23]).
- When risk factors were considered, in the unadjusted analysis an increase in the number of suicides occurring in the context of unemployment was identified (unadjusted RR 1.53 [95% CI 1.18–1.96]). Specifically, there was an increase in males aged 25-64 years (unadjusted RR 1.53 [95% CI 1.12-2.05]) recorded as experiencing unemployment proximal to suicide. There was a decrease in the number of suicides occurring in the context of relationship breakdown (unadjusted RR 0.82 [95% CI 0.67–0.99]). However, when the models were adjusted for possible over-dispersion, seasonality and non-linear trend, no significant changes were identified. As such,

we have only low to moderate confidence in these findings related to unemployment and relationship breakdown since they were not adjusted for typical confounding variables in time series analyses.

- We were able to use real-time data from three Australian states, which allowed us to examine trends in a way that would not have been possible had we been reliant on official suicide statistics. The data we drew upon are being produced in near real-time in these three states, and other states are also now establishing similar registers. This creates the opportunity to extend the analysis into the present and produce 'rolling updates' on the themes and issues identified here.
- One study limitation is the reliance on information provided by police. This information can vary greatly in detail, and introduces the possibility of underreporting risk factors. Another limitation, is that we could only examine risk factors that were consistently captured across suicide registers and that could be reasonably expected to be recorded by police (i.e., known about at the time of initial police investigations). Another limitation is that the number of monthly suicides was often low, meaning that small changes could result in large rate ratios, even though the absolute change was small.
- The identified increase in suicide in young men during the initial months of the COVID-19 period indicates that the impacts of the pandemic are likely not evenly distributed across populations. Young males warrant special consideration as a group who may be particularly adversely affected by the pandemic.
- The increase in suicides in the context of unemployment reinforces the strong need for mitigation measures in the context of COVID-19.
- Continued monitoring of suicide data is essential, particularly as government support has reduced. This monitoring should include investigating what happens in suicide numbers overall and in subgroups, and should also continue to consider risk factors such as unemployment.



## Introduction

The COVID-19 pandemic has had damaging health, social and economic impacts across the world. In some countries the health impacts have been dominated by the large number of deaths as a direct result of COVID-19.<sup>1</sup> In countries like Australia, where the numbers of COVID-19 cases and deaths have been fewer, the health impacts are likely to relate more to the consequences of social distancing and stay-at-home orders.<sup>2</sup> There has been considerable concern about the mental health of populations during this time and in particular, concerns that suicides might increase as a consequence of the pandemic.<sup>3-5</sup> To date, most international and Australian based research has found no overall increase in suicides in the initial months of the pandemic.<sup>6-8</sup> However, experts have noted that we need to remain vigilant, and that increases in suicide may still occur.<sup>2,9</sup> Recent findings from Japan suggest this caution is warranted; after an initial reduction in suicide in that country, there was a subsequent increase.<sup>10,11</sup>

In addition to continuing to monitor overall trends in suicide as the pandemic continues, it is important to consider whether patterns may vary for different subgroups in the population.<sup>9</sup> Monitoring suicide numbers for different demographic subgroups (e.g., males and females in different age groups) is important, but even this only tells part of the story. It is also important to track whether certain the social determinants of suicide are increasingly being implicated in suicides during the pandemic. Doing so will give us deeper insights into where to focus prevention efforts. The effects of economic damage from the pandemic such as financial problems and unemployment are a major concern given research following the global economic crisis of 2008 showed an increase in suicide in two thirds of the countries studied.<sup>12</sup> Other risk factors for suicide that may be heightened by the pandemic include relationship breakdown and homelessness.

Recent research from Queensland using the interim Queensland Suicide Register (iQSR), found no absolute or relative increases in four motives for suspected suicides, namely recent unemployment, financial problems, relationship breakdown, or domestic violence in the initial months of the pandemic.<sup>7</sup> The current study complements the Queensland study<sup>7</sup> by including data from the Victorian Suicide Register (VSR) and the Tasmanian Suicide Register (TSR). Pooling data from these three registers meant that we could include approximately half of all the suicides that occurred in Australia over the study period and allowed us to build on other research by stratifying the analyses by age group and sex of the deceased. The aims of this study were two-fold: (1) to determine whether there has been a change in the number of suicides occurring overall and in age and sex subgroups since the COVID-19 pandemic began and (2) to determine whether particular risk factors for suicide (namely relationship breakdown, financial stressors,

unemployment, and homelessness) have become more prominent as likely underlying contributing factors for suicide during the pandemic.

## Method

### *Overview*

Using real-time suicide data from the iQSR, the TSR and the VSR, we ran multiple interrupted time-series analyses to ascertain whether trends in monthly suicide counts changed after the pandemic began and whether there had been an increase in suicides where relationship breakdown, financial stressors, unemployment and homelessness were recorded by police as likely contributing factors to the suicide.

### *Data sources and inclusion criteria*

We pooled data from the iQSR, the TSR and the VSR for the period from 1<sup>st</sup> January 2017 to 31<sup>st</sup> August 2020. The fact that the data sources for this study are real-time registers means that the suicides registered within them are “suspected” based on coders’ judgements (which in turn are based largely on initial police evidence) and not yet confirmed by the coroner.

The first case of COVID-19 in Australia was confirmed by Victorian Health Authorities on the 25<sup>th</sup> January 2020 and cases in New South Wales and Queensland were confirmed in the following days.<sup>13,14</sup> Therefore, we chose 1<sup>st</sup> February 2020 as the beginning date of our COVID-19 period and data included suspected suicides occurring in the 37 months before (1<sup>st</sup> January 2017-31<sup>st</sup> January 2020) and the seven months after (1<sup>st</sup> February 2020-31<sup>st</sup> August 2020) these first cases of COVID-19 were identified in Australia. Variables of interest were age group and sex of the deceased, month of death, evidence of relationship breakdown, evidence of other financial stressor, evidence of unemployment, and evidence of homelessness.

### **Interim Queensland Suicide Register (iQSR)**

The sole data source for the iQSR is the Form 1 police report of a death to a coroner. These reports inform coroners of the circumstances of the death and characteristics of decedents, to assist forensic pathologists and coroners in determining the cause of death and potential intent of the deceased. The Form 1 police reports are completed by a police officer soon after a death, following an interview with the deceased’s next-of-kin or other available people who knew the deceased. Two QSR staff independently class the probability of the death being a suicide as possible, probable, or beyond reasonable doubt. The iQSR methodology is discussed in detail elsewhere.<sup>15</sup> For this study we took the responses to the question “Is there any possible motive/trigger for the suicide?” and coded the presence of relationship breakdown,



financial stressors and unemployment. We used the variable “Residency” to code for evidence of homelessness.

### **Tasmanian Suicide Register (TSR)**

Notification of suspected suicides for the TSR is by the police report of death for the Coroner. This report is filled out by police officers who first attend the death and is based on a mix of structured items such as date and time of death, socio-demographic information, and on an additional unstructured narrative of police circumstances generated following interviews with witnesses and/or the senior next-of-kin. Suicides are classified using these initial interviews, any statements by the deceased to family friends, notes/letters outlining intent, and known previous suicide attempts. Each of these is recorded on the police report of death. To code the presence of stressors in each suicide, we used certain items on the police report, namely the presence of possible motive/triggers for the suicide (specifically relationship breakdown, financial problems and unemployment). We used the variable “Residence status” to determine whether the individual was homeless.

### **Victorian Suicide Register (VSR)**

The VSR includes the full text of the summary of circumstances that Victoria Police submit when initially reporting a death to the Coroners Court of Victoria. The summary of circumstances is an unstructured narrative prepared in the hours after the death or discovery of body and includes whatever relevant information the reporting police officer can ascertain based on attendance at the scene of death and speaking with witnesses. The detail and accuracy of information contained therein is largely dependent on what can be established at the time. Some summaries include extensive accounts of the events leading up to death recounted by family members, acquaintances, treating medical practitioners, and through suicide notes found at the scene. In other cases, particularly where the deceased's identity cannot initially be ascertained, the summary of circumstances may be little more than a description of the scene of death. Despite their varying quality, the summaries of circumstances are a valuable resource because they are the only immediate information on the context in which Victorian suicides occur. For this study, we coded the presence of the four risk factors of interest if there was any suggestion in the police summary that those factors may have been implicated in the suicide.

### *Data analysis*

We combined data from the iQSR, TSR and VSR into a single dataset that aggregated data at the monthly level for six different groups (men and women aged under 25 years, 25-64 years and 65 years and older).

We used these data to estimate any change in the number of suicides during the pandemic compared with the period prior to the pandemic.

We explored whether there was a change in the number of suicides per month in unadjusted and adjusted analyses. In our unadjusted analysis, we compared the average number of suicides in the pre-COVID-19 period (number of suicides divided by the number of pre-COVID months) to the average number of suicides during the first months of the pandemic (calculated the same way for the pandemic period). We did this by calculating a rate ratio, defined as the ratio of these two averages. We did this for all suicides, for age-sex strata, and for the age-sex strata of the four different risk factors (i.e., relationship breakdown, unemployment, financial stressors, and homelessness).

In our adjusted analyses, the rate ratio was calculated using interrupted time series analysis by fitting Poisson regression models to the monthly data. Our model included a binary variable for the pandemic (coded 0 in the pre-COVID-19 period and 1 during the pandemic), and non-linear terms for time, including seasonality. The ITS model was therefore:

$$\log(y_t) = \beta_0 + \beta_1 x_1 + f(time)$$

where  $x_1$  was a binary coded variable that is equal to 1 if the observation is during the pandemic period and 0 otherwise,  $f(time)$  was a function for time. The exponential of the parameter  $\beta_1$  was interpreted as the rate ratio of interest, i.e.  $e^{\beta_1} = RR$ . The function for time comprised two components: long-term time trends (using fractional polynomials) and short-term trends (using Fourier terms, i.e. Sine and Cosine pairs). Overdispersion was addressed by use of a scaling parameter set to the estimated Pearson chi square statistic divided by the residual degrees of freedom. Adjusted analyses were run for all suicides, for age-sex strata, and for the age-sex strata of the four different risk factors.

## Results

Over the entire study period there were 5,791 suicides recorded across Queensland, Tasmania and Victoria (Table 1). Males accounted for 75.4% of these suicides (n=4,366) and the majority occurred among people aged 25-64 years (70.5%, n=4,080).

In the pre-COVID-19 period there were 4,878 suicides recorded, an average of 131.8 suicides per month. In the first seven months since the declaration of the COVID-19 pandemic there were 913 suicides recorded, an average of 130.4 per month. Males accounted for approximately three-quarters of suicides in both the pre-COVID-19 period and the COVID-19 period (75.4% and 75.6%, respectively). People aged 25-64 years accounted for 70.5% of suicides overall, 71.0% in the pre-COVID-19 period and 67.8% in the COVID-19 period.

*Table 1 Counts of suspected suicides in each time period (before and during COVID-19), by age group and sex*

	Total		1 Jan 2017-31 Jan 2020 (Pre COVID-19, 37 months)		1 Feb 2020-31 August 2020 (COVID-19, 7 months)	
	n	% of all suicides	n	% of all suicides	n	% of all suicides
<b>All</b>	5791	100.0	4878	100.0	913	100.0
<25 years	833	14.4	685	14.0	148	16.2
25-64 years	4080	70.5	3461	71.0	619	67.8
65+ years	878	15.2	732	15.0	146	16.0
<b>Males</b>	4366	75.4	3676	75.4	690	75.6
<25 years	617	10.7	504	10.3	113	12.4
25-64 years	3104	53.6	2633	54.0	471	51.6
65+ years	645	11.1	539	11.0	106	11.6
<b>Females</b>	1425	24.6	1202	24.6	223	24.4
<25 years	216	3.7	181	3.7	35	3.8
25-64 years	976	16.9	828	17.0	148	16.2
65+ years	233	4.0	193	4.0	40	4.4

Of the four risk factors for suicide examined in this study, relationship breakdown was the most frequently recorded by police (Table 2). There were 1,336 cases of suicide for which relationship breakdown was recorded, 23.5% in the pre-COVID-19 period and 20.9% of cases in the COVID-19 period. There were 442 cases of suicide for which the presence of financial stressors was recorded (7.6%), 361 for which unemployment was recorded (6.2%), and 90 for which homelessness was recorded (1.6%).

*Table 2 Counts of suspected suicides in each time period (before and during COVID-19), by presence of risk factors*

	Total		1 Jan 2017-31 Jan 2020 (Pre COVID-19)		1 Feb 2020-31 August 2020 (COVID-19)	
	n	% of all suicides	n	% of all suicides	n	% of all suicides
<b>Risk factors</b>						
<b>Relationship breakdown</b>	1336	23.1	1145	23.5	191	20.9
<b>Financial stressors</b>	442	7.6	369	7.6	73	8.0
<b>Unemployment</b>	361	6.2	280	5.7	81	8.9
<b>Homelessness</b>	90	1.6	75	1.5	15	1.6

### Changes over time

The observed number of suicides in the pre-COVID-19 period and the COVID-19 period, the mean number of suicides per month in each period, and the unadjusted and adjusted rate ratios (RRs) are shown in Table 3. Compared with the period before COVID-19, during the COVID-19 period there was no change in the number of suicides overall (unadjusted RR 0.99 [95% CI 0.92-1.06]; adjusted RR 1.10 [95% CI 0.93-1.32]), or in most stratum-specific estimates. However, there was an increase in the number of young males who died by suicide in the COVID-19 period in the adjusted model (adjusted RR 1.89 [95% CI 1.11-3.23]).

When risk factors were considered, the unadjusted analysis showed significant differences in suicide in the context of unemployment and relationship breakdown during the COVID-19 compared to the pre-COVID-19 period. Analysis showed an increase in the number of suicides occurring in the context of unemployment in the COVID-19 period (unadjusted RR 1.53 [95% CI 1.18–1.96]). Specifically, there was an increase in suicides in males (unadjusted RR 1.58 [95% CI 1.20-2.07]) and an increase in males aged 25-64 years (unadjusted RR 1.53 [95% CI 1.12-2.05]) recorded as experiencing unemployment proximal to suicide. In contrast, there was a decrease in the number of suicides occurring in the context of relationship breakdown in the COVID-19 period (unadjusted RR 0.82 [95% CI 0.67–0.99]). However, when the models were adjusted for possible over-dispersion, seasonality and non-linear trend, no significant changes were identified.

Table 3 Unadjusted and adjusted rate ratios of suspected suicides in the COVID-19 period based on the trends in the pre-COVID-19 period

	Number of suicides		Mean suicides (per month)		Unadjusted rate ratio	Adjusted rate ratio
	Pre-COVID-19 (37 months)	COVID-19 (7 months)	Pre-COVID-19	COVID-19	RR (CI)	RR (CI)
<b>All</b>	4878	913	131.84	130.43	0.99 (0.92, 1.06)	1.10 (0.93, 1.32)
<b>Males</b>	3676	690	99.35	98.57	0.99 (0.91, 1.08)	1.12 (0.90, 1.41)
<25 years	504	113	13.62	16.14	1.19 (0.96, 1.46)	<b>1.89 (1.11, 3.23)**</b>
25-64 years	2633	471	71.16	67.29	0.95 (0.86, 1.04)	1.01 (0.83, 1.22)
65+ years	539	106	14.57	15.14	1.04 (0.84, 1.28)	0.93 (0.67, 1.30)
<b>Females</b>	1202	223	32.49	31.86	0.98 (0.85, 1.13)	0.94 (0.80, 1.10)
<25 years	181	35	4.89	5.00	1.02 (0.69, 1.47)	1.50 (0.69, 3.26)
25-64 years	828	148	22.38	21.14	0.94 (0.79, 1.13)	0.95 (0.74, 1.20)
65+ years	193	40	5.22	5.71	1.10 (0.76, 1.55)	0.74 (0.44, 1.24)
<b>RELATIONSHIP BREAKDOWN</b>						
<b>All</b>	1145	191	30.95	27.29	0.88 (0.75, 1.03)	0.97 (0.78, 1.19)
<b>Males</b>	923	152	24.95	21.71	0.87 (0.73, 1.03)	0.84 (0.57, 1.25)
<25 years	104	23	2.81	3.29	1.17 (0.71, 1.85)	2.24 (0.85, 5.90)
25-64 years	758	118	20.49	16.86	<b>0.82 (0.67, 0.99)**</b>	0.78 (0.48, 1.25)
65+ years	61	11	1.65	1.57	0.95 (0.45, 1.83)	0.31 (0.05, 1.84)
<b>Females</b>	222	39	6.00	5.57	0.93 (0.64, 1.31)	0.80 (0.56, 1.16)
<25 years	46	7	1.24	1.00	0.80 (0.31, 1.79)	2.09 (0.35, 12.41)
25-64 years	160	31	4.32	4.43	1.02 (0.67, 1.51)	0.90 (0.55, 1.47)
65+ years	16	<5	0.43	a	0.33 (0.01, 2.13)	0.49 (0.02, 12.62)
<b>FINANCIAL STRESSORS</b>						
<b>All</b>	369	73	9.97	10.43	1.05 (0.80, 1.35)	1.43 (0.77, 2.64)
<b>Males</b>	312	66	8.43	9.43	1.12 (0.84, 1.46)	1.36 (0.76, 2.45)
<25 years	19	6	0.51	0.86	1.67 (0.55, 4.35)	3.27 (0.93, 11.45)
25-64 years	265	51	7.16	7.29	1.02 (0.74, 1.38)	1.37 (0.73, 2.58)
65+ years	28	9	0.76	1.29	1.70 (0.71, 3.70)	2.88 (0.98, 8.44)
<b>Females</b>	57	7	1.54	1.00	0.65 (0.25, 1.43)	1.95 (0.24, 15.97)
<25 years	<5	0	a	0.00	0 (0, 28.14)	b
25-64 years	48	6	1.30	0.86	0.66 (0.23, 1.55)	2.51 (0.28, 22.39)
65+ years	7	<5	0.19	a	0.76 (0.02, 5.88)	1.52 (0.10, 22.65)
<b>UNEMPLOYMENT</b>						
<b>All</b>	280	81	7.57	11.57	<b>1.53 (1.18, 1.96)**</b>	1.26 (0.70, 2.26)
<b>Males</b>	237	71	6.41	10.14	<b>1.58 (1.20, 2.07)**</b>	1.16 (0.63, 2.12)
<25 years	25	9	0.68	1.29	1.90 (0.78, 4.21)	1.68 (0.35, 7.99)
25-64 years	204	59	5.51	8.43	<b>1.53 (1.12, 2.05)**</b>	1.07 (0.52, 2.21)
65+ years	8	<5	0.22	a	1.98 (0.34, 8.26)	0.74 (0.18, 3.06)
<b>Females</b>	43	10	1.16	1.43	1.23 (0.55, 2.48)	1.42 (0.57, 3.55)
<25 years	<5	0	a	0.00	0 (0, 28.14)	b
25-64 years	39	10	1.05	1.43	1.36 (0.6, 2.76)	1.58 (0.61, 4.07)
65+ years	<5	0	a	0.00	0 (0, 28.14)	b
<b>HOMELESSNESS</b>						
<b>All</b>	75	15	2.03	2.14	1.06 (0.56, 1.86)	0.54 (0.29, 1.01)
<b>Males</b>	61	13	1.65	1.86	1.13 (0.57, 2.07)	0.57 (0.28, 1.16)
<25 years	<5	<5	a	a	3.52 (0.29, 30.76)	b
25-64 years	52	11	1.41	1.57	1.12 (0.53, 2.17)	0.52 (0.24, 1.13)
65+ years	6	0	0.16	0.00	0 (0, 4.49)	b
<b>Females</b>	14	<5	0.38	a	0.76 (0.08, 3.29)	0.43 (0.08, 2.27)
<25 years	<5	<5	a	a	2.64 (0.04, 50.77)	b
25-64 years	10	0	0.27	0.00	0 (0, 2.36)	b
65+ years	<5	<5	a	a	2.64 (0.04, 50.77)	b

Notes a: not shown due to low cell count, b: model could not be fitted to the data. \*\* P < .05

## Discussion

We identified several key findings in this analysis of real-time suicide surveillance data in Queensland, Tasmania and Victoria. Firstly, we found that there was no overall increase in suicides in the initial months of the pandemic when compared to the pre-COVID-19 period. However, we identified an increase in suicides in males younger than 25 years. Additionally, we found unemployment was noted as a stressor implicated in more suicides occurring during the COVID-19 period when compared to the pre-COVID-19 period, and that this was due to an increase in these cases in males aged 25-64 years. There was no increase in unemployment-related suicides in young males despite this age group being the only one to show an overall increase in the number of suicides over the initial months of the pandemic. We also identified a small decrease in suicides in men aged 25-64 years occurring in the context of relationship breakdown. Although these changes in suicides in the context of unemployment and relationship breakdown were identified in our unadjusted analysis, no significant changes were identified in our adjusted analysis and as such, we have only low to moderate confidence in these findings related to unemployment and relationship breakdown since they were not adjusted for typical confounding variables in time series analyses. The finding in which we have the most confidence, is the significant increase in suicides in young males in the first seven months of the COVID-19 pandemic.

Our finding of no increase in suicides overall, is consistent with those of other published studies from high-income and upper-middle-income countries, which have found either decreases or no changes in suicide rates over the early months of the pandemic.<sup>6,7,16-18</sup> The largest of these studies analysed data from 21 high- and upper-middle-income countries (including all three data sources used in our study) and found no evidence of a significant increase in suicide rates from since the beginning of the pandemic to the end of July 2020.<sup>6</sup> The circumstances brought upon by the pandemic could have had positive impacts on mental health, especially in the initial months of the pandemic.<sup>6,19</sup> It is therefore possible that some positive impacts of COVID-19, have balanced, or served as protective against the expected negative impacts and could at least partially explain why we did not find an overall increase in suicides in the early months of the pandemic.

Given these previous studies, and the overlap in some of the data sources, it is not surprising that we found no overall increase in suicides in the initial months of the pandemic. However, by pooling the data from the three registers we were able to stratify our analysis by sex and age group and identify a significant increase in suicides in males aged younger than 25 years. There is considerable research regarding negative outcomes associated with the pandemic that suggests young people are being

disproportionately affected.<sup>20,21</sup> A recent study of suicide rates found that effects of the pandemic were not evenly distributed across populations in Japan.<sup>10</sup> Although the greatest increases in suicides in Japan were observed in females, rather than in males as we found, significant increases were also identified in people aged younger than 20 years.<sup>10</sup> Young males warrant special consideration as a group who may be particularly adversely affected by the pandemic. We know that rates of suicide in this group are already high,<sup>22</sup> and that certain factors may contribute to their over-representation in suicide statistics. For example, compared with their female counterparts, males are more likely to choose lethal means,<sup>23</sup> more likely to use drugs and alcohol,<sup>24</sup> and less likely to seek help.<sup>24</sup> These factors, combined with the enormity of the mental health and economic impacts of COVID-19, may mean that young males have been particularly hard hit by the pandemic.

Despite young males being the only age group to show an overall increase in suicides, we were unable to directly ascertain whether any of the four risk factors appeared to be contributing to this increase. However, a few findings from our adjusted analysis may give us a clue as to what might be driving this increase in young men. After adjustment for confounding, we observed large rate ratios for young men in the context of relationship breakdown and financial difficulties (RR = 2.24 and 3.27, respectively). These rate ratios, however, were non-significant, and this is likely due to a lack of statistical power. If data were available for the whole country, or for a longer time period, there would be more data available for analysis in the pandemic period which would increase statistical power, and it is conceivable that these findings would be statistically significant.

It is also possible that other risk factors are contributing to the observed increase in suicides in young men. It was out of the scope of this study to investigate all the potential risk factors that might have been heightened by the pandemic, although young people might have been particularly affected by measures introduced to reduce the spread of COVID-19 such as lockdowns and physical distancing. These measures have increased isolation,<sup>4</sup> a known risk factor for suicide.<sup>25</sup> In addition, young people's educational experiences have been greatly impacted during the pandemic and uncertainty about future employment is likely given the current circumstances. Continued monitoring of the overall number of suicides, as well as risk factors associated with suicides in young men, is essential.

We found some evidence of significant increase in the number of suicides occurring in the context of unemployment, due to an observed increase in these suicides in males aged 25-64 years. This is consistent with research that showed increases in suicide rates in the majority of countries that were affected by the global economic crisis of 2008 and that this occurred particularly in men affected by unemployment.<sup>12</sup>

The identified increase in unemployment-related suicides in our study occurred in the early months of the pandemic even in the context of interventions which were introduced (i.e., JobKeeper) or strengthened (i.e., Coronavirus Supplement/JobSeeker) in Australia to buffer the effects of unemployment as a result of the pandemic.<sup>5</sup> Early results from the “Taking the Pulse of the Nation” survey of 1,200 adults suggests that following these government initiatives, self-reported financial stress fell to 20% (from 25% in early months of the pandemic) and remained steady during June and July.<sup>5</sup> However in the second half of 2020 with announcement of plans to reduce support, financial stress increased even though the economy was starting to re-open.<sup>5</sup> It will be critical to continue to monitor the impact of unemployment and financial stressors on suicide, especially as these government supports are scaled back.

We had thought relationship breakdowns may be one of the risk factors that would be more likely to be implicated in suicides occurring during the pandemic, but we found the opposite. In fact there was a slight decrease in suicides in men aged 25-64 years occurring in the context of relationship breakdown. It is possible that for some relationships may have strengthened because couples and families spent more time together, and this could have been protective against suicide. For others, relationship difficulties may have been significant and even exacerbated, but couples may have been unable to separate (especially in areas that had protracted lockdowns) which may have artificially masked relationship breakdowns. There is some evidence that there has been a decrease in rates of divorce in the US during the early months of the pandemic but in some state the initial declines have now rebounded.<sup>26</sup>

## **Implications**

Continued monitoring of suicide data is essential, particularly as government support has reduced, and given further lockdowns have occurred across many areas in Australia. This monitoring should include investigating what happens in suicide numbers overall and in subgroups, and should also continue to consider risk factors such as unemployment. This is especially crucial given that in the Australian context there is some evidence that after initial reductions in emergency mental health-related ambulance call outs and presentations to emergency departments,<sup>27-29</sup> increasing trends have been identified in later months of the pandemic.<sup>29</sup>

Ideally, patterns of suicide in different geographical areas and in different populations could be examined, not only at the state level but in smaller geographical regions and in populations (for example Aboriginal and Torres Strait Islander peoples, the LGBTIQ+ population, young people, culturally and diverse populations and people with disabilities) who may be disproportionately affected by the impacts of the



pandemic. It was outside the scope of this analysis to consider external factors that might have influenced suicide patterns in different states, including varying public health measures or economic support packages, but this could also be an area for future research.

Qualitative research, particularly with people with lived experience of suicide, is essential to understand the stories behind the statistics presented in a study such as this. The increase in suicides in young males is worrying and given none of the stressors we studied appeared to be more commonly reported by police in suicides by this group during the pandemic, further research with young males is essential.

### **Strengths and limitations**

We were able to use real-time data from three Australian states, which allowed us to examine trends in a way that would not have been possible had we been reliant on official suicide statistics. The data we drew upon are being produced in near real-time in these three states, and other states are also now establishing similar registers. This creates the opportunity to extend the analysis into the present and produce 'rolling updates' on the themes and issues identified here.

This current study has a number of limitations. One major limitation is the reliance on information provided by police. In Queensland and Tasmania, the standardised police forms used for this study were completed by a police officer soon after death, and in Victoria we used the information from the initial police summary of circumstances. The police summaries of circumstances vary greatly in detail, and the reliance on information supplied by police very soon after the death in all data sources, introduces the possibility of underreporting risk factors. Although the presence of recent relationship breakdown reported in our study is largely consistent with research published using the full suicide registers in Victoria and Queensland,<sup>30-31</sup> the presence of the other risk factors such as unemployment and financial related stressors is lower in this study compared to another Victorian study.<sup>32</sup> Another limitation, is that we could only examine risk factors that were consistently captured across suicide registers and that could be reasonably expected to be recorded by police (i.e., known about at the time of initial police investigations).

Another limitation is that the number of monthly suicides was often low, meaning that small changes could result in large rate ratios, even though the absolute change was small. Finally, our study may be underpowered because statistical power in this context is largely a function of the number of time points available for analysis, with optimal power achieved when there are large numbers of time points in the periods of interest. In our study there were seven months available for analysis for the COVID-19 period and 37 from the pre-COVID period. However, the need for using data with high statistical power needs to

be balanced against the broader need to identify any trends which signify worsening mental health conditions and therefore an increased suicide risk.

### **Conclusion**

Our findings reinforce the importance of proactive responses to the mental health and economic consequences of the pandemic. Although our analysis shows the predicted increase in suicides associated with the pandemic have not yet eventuated, the picture is complex and the identified increase in suicide in young men indicates that the impact of the pandemic is likely not evenly distributed across populations. The increase in suicides in the context of unemployment reinforces the strong need for mitigation measures in the context of COVID-19, and for continued monitoring of suicide given the ongoing nature of the pandemic.

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