Alcohol consumption and mental health conditions: Insights from a South Australian population survey to inform policy and practice

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Abstract

Objective: Among individuals with a mental health condition co-occurring alcohol use disorders are common, but less is known about alcohol consumption in excess of recommended drinking guidelines. This study investigated the prevalence of lifetime risky drinking (>2 drinks daily) and single occasion risky drinking (>4 drinks on one occasion) among individuals with mental health conditions of different severities.

Methods: Data from representative cross-sectional population surveys among South Australians aged ≥15 years (n=11,761) were utilised. Logistic regression models assessed associations between risky alcohol consumption, presence of a mental health condition and demographic characteristics.

Results: Prevalence of lifetime risky drinking was greater among both males and females with a mental health condition (p>0.001). Single occasion risky drinking was more prevalent among males with a severe mental health condition (p=0.01). Adjusted logistic regressions showed that only females with a mental health condition had greater odds of exceeding lifetime risky drinking levels (OR=1.39, CI 1.11 to1.75).

Conclusions: There are sex-specific relationships between risky alcohol consumption and mental health conditions.

Implications for public health: Risky alcohol consumption, in excess of guidelines, is of concern among those with a mental health condition and requires attention at an individual and population level.

Key words: alcohol, mental health disorder, substance use

Alcohol consumption and mental illness are both prevalent health concerns in Australia.[1,2] In 2019, 77% of Australians aged 14 years and older had consumed a full serve of alcohol in the past year. Furthermore, almost 50% of Australians believe regular alcohol consumption, by an adult, to be acceptable.[3] Similarly, almost half of Australians aged 16-85 years are expected to experience a mental health disorder at some stage in their life.[2] The most prevalent disorders in Australia are anxiety, affective and substance use disorders (including alcohol use disorder).[2] Alcohol consumption and mental health conditions have a number of costs associated with them, including direct government expenditure and individual out-of-pocket costs, as well costs of carer responsibilities and lost productivity.[4,5] A report by the Australian Government Productivity Commission estimated the cost of disability and premature death due to mental illness, suicide and self-inflicted injury to be $151 billion annually to the Australian economy.[6]

Typically, research focusing on the relationship between alcohol and mental illness has focused on consumption at levels that constitute an alcohol use disorder (AUD).[7] AUDs can be classified as mild, moderate or severe. They are often characterised by a lack of control over alcohol use and symptoms of withdrawal or negative emotions when not drinking.[8] Research shows that nearly one in five individuals with a current AUD also have a comorbid anxiety or mood disorder.[9] Longitudinal studies have attempted to understand whether there is a causal relationship between AUDs and mental illness and, if so, the direction of the relationship. Understandably there have been challenges confirming causality due to differences regarding classification and measurement of mental illnesses, different alcohol use measures and insufficient information of confounding factors. There are, however, a number of theories that can help explain the often bidirectional nature of the relationship. These include the self-medication theory, the downward spiral model and the shared exogenous factor theory. The self-medication theory suggests psychiatric disorders emerge before the onset of an AUD and a consequent AUD could be prevented with

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early intervention and improved disease management.[10] In contrast, the downward spiral model is where risk behaviours, like problematic drinking, initiate a number of negative actions in which a mental health condition is the outcome.[11,12] Finally, primary drivers of both AUD and psychiatric disorders, like adverse childhood experiences, are said to result in dual diagnoses; supporting the shared exogenous factor theory.[13] In turn these theories suggest there is no single linear or causal relationship between AUDs and mental illnesses.

Both within Australia and globally, there has been a shift in the purpose of drinking guidelines from defining 'safe' levels of alcohol consumption, to now specifying guidelines that infer 'low-risk' levels of consumption.[14] This comes as research has found there is no safe level of alcohol consumption for various non-communicable diseases, most notably cancer.[15] In Australia drinking guidelines help the Australian community make informed decisions about reducing health risks from drinking alcohol and provide guidance to health professionals and policy makers. Created by the National Health and Medical Research Council (NHMRC), this study used the Australian Guidelines to Reduce Health Risks from Drinking Alcohol 2009.[16] The best available evidence at the time of issue was used to inform the guidelines, which included many epidemiological studies and large meta-analyses.[16] Recommendations in the guidelines are based on the Australian standard drink, defined as 10g of alcohol or 12.5mL of pure alcohol, with recommendations the same for men and women.[16] The specific guidelines of interest for this study were:

Guideline 1: Reducing the risk of alcohol-related harm over a lifetime (Lifetime risk)

For healthy men and women, drinking no more than two standard drinks on any day reduces the lifetime risk of harm from alcohol-related disease or injury.

Guideline 2: Reducing the risk of injury on a single occasion of drinking. (Single occasion risk)

For healthy men and women, drinking no more than four standard drinks on a single occasion reduces the risk of alcohol-related injury arising from that occasion.

Guideline 1 aims to reduce alcohol-related diseases including, but not limited to, cancers of the oral upper aero-digestive tract, the female breast and colon.[17] Other diseases aiming to be reduced are cardiovascular disease, diabetes, nutrition related conditions, obesity, liver disease and tolerance or dependence.[16] Single occasion risks aiming to be reduced by Guideline 2 include injuries sustained while intoxicated and engagement with risky behaviours. These include behaviours like drunk driving, having unprotected sex, deliberate self-harm and assault.[16,18] At the population level, there is poor community awareness of the Guidelines with only 20.3% of the Australian population being able to identify the correct threshold for men and 53.5% for women.[19]

In 2019 alone 16.8% of Australians aged 14 years and older were exceeding the lifetime risk guideline of >2 drinks per day on average, and 24.8% exceeding the single occasion risk guideline, at least monthly, of >4 drinks on a single occasion.[1] Additionally, some populations are overrepresented in these statistics including Aboriginal and Torres Strait Islander Peoples, young Australians (aged 16-24 years) and individuals living in remote and very remote locations.[3] These populations often have the highest prevalence of mental health conditions as well.[2]

Previous studies have explored the association between mental health conditions and levels of alcohol consumption in the context of United Kingdom, Canadian and Russian drinking guidelines, however, have found varying results.[20,21] Findings have included: no association between greater than guideline drinking and major depressive episodes in a Canadian longitudinal study; and in Russian men, frequency of alcohol consumption and total volume of ethanol consumed did not affect Mental Component Scores in a cross-sectional study.[21,22] In contrast, some research has suggested possible protective effects against common mental disorders, including depression and generalised anxiety disorder with moderate alcohol consumption.[7] It should be noted, however, international variance in the measurement of a 'standard drink' and differences between drinking guidelines, limit the generalisability of these findings to an Australian context. This is particularly evident in a Danish prospective cohort study which found that females who were drinking above 'sensible' alcohol limits increased their risk of developing a psychiatric disorder, but among males, low to moderate alcohol intake provided a protective effect. In this study however a standard drink was 12g, rather than 10g as defined in Australia, and specified different guidelines for males and females.[23] Significant variation in study populations, alongside international guideline variations, provide little insight into whether there is an association between greater than guideline drinking and mental health conditions for Australians.

Investigating the prevalence of alcohol consumption at levels not associated with dependence, but rather an increased risk for chronic disease and/or injury will improve the understanding of the burden of alcohol consumption and mental health conditions within the Australian population. Furthermore, it is likely that associations and conclusions drawn regarding mental health conditions and AUD would differ greatly when a more 'moderate' measure of alcohol consumption is used, such as drinking in excess of alcohol guidelines. Currently no study has used the NHMRC guidelines as a measure of alcohol consumption in relation to mental health symptoms, despite a large number of individuals drinking above stipulated thresholds.[1] As such, the overarching aim of this study was to assess the prevalence of risky alcohol consumption among people with a self-reported mental health condition and explore if this varied across differing severities of mental health symptoms and key demographics. Due to previous population surveys revealing significant sex differences between males and females in relation to both the prevalence of risky alcohol consumption[1] and mental illness[24] analyses were stratified for males and females. An example of the significant sex differences can be seen in the National Drug Strategy Household Survey where 24.4% of males aged 14+ years were lifetime risky drinkers consuming more than two drinks per day on average whilst only 9.4% of females were drinking at the same risk level.

Methods

Design and participants

Data from the South Australian Health Omnibus Survey (HOS) years 2014-2017 were used for analyses. The HOS is an annual, representative, cross-sectional survey which has been in operation since 1990. There is a 'user-pays' format for the survey, with several government and non-government

organisations using the survey to obtain data on South Australians to assist with the planning, implementation and monitoring of health programs and other initiatives. A random sample of South Australians aged ≥ 15 years from metropolitan Adelaide and rural/remote South Australia were selected for the survey using a clustered, self-weighting, multi-stage method. The person in the household who had their birthday most recently was selected for the interview. Data collected in the surveys was weighted to the South Australian population, per the 2016 Australian Bureau of Statistics Census, by five-year age groups, sex, geographic area and probability of selection within the household. Complete methods of the HOS have been published elsewhere.[25] Each year, approximately 3,000 individuals from across the state responded to the face-to-face interviews. Participation rates ranged from 60.6% in 2014 to 68.0% in 2016. Data from the most recent four years (2014-2017) were merged for analyses in order to yield greater power. To ensure samples could be combined, prevalence trends were examined over time and no statistically significant variations were found between survey years for the main outcome variables (alcohol use and mental health condition). The total sample size was 11,361 from participants answering both alcohol and mental health questions.

Measures

The main outcome measures in this study were drinking at either 'lifetime risky levels' or 'single occasion risky levels' by self-reported mental health symptoms. In all four survey years, 10 questions were used to assess alcohol consumption, in relation to the number of standard drinks consumed, using a graduated frequency method from the National Drug Strategy Household Survey (2010). Questions included 'In the last 12 months, how often did you have an alcoholic drink of any kind?', 'On a day that you have an alcoholic drink, how many standard drinks do you usually have?' (prompt card shown), 'In the last 12 months how often did you have 20 or more standard drinks a day?', '11-19 a day', 7-10 a day', '5-6 a day', '3-4 a day', '1-2 a day', 'less than 1 standard drink per day' and 'no alcohol in a day'. Data were coded according to 'lifetime risk' and 'single occasion risk'. Lifetime risk relates to 2009 NHMRC alcohol guideline 1 (>2 standard drinks on any day)[16] with responses categorised as: abstainers; ≤2 drinks per day on average; >2 drinks per day on average; and missing. Single occasion risk relates to alcohol guideline 2 (>4 standard drinks on a single occasion)[16] and were categorised as: abstainers, low risk (consumes alcohol but never >4 drinks on an occasion), at least yearly but not monthly, at least monthly but not weekly and at least weekly. (Note the NHMRC alcohol guidelines were updated in December 2020. For the purpose of this paper, we were interested in examining short versus longer term impacts, and the 2009 guidelines were relevant to the survey years for the available dataset.)

Two self-report survey questions were used to assess presence of a mental health condition in line with prior population studies.[26] The first was 'Are you currently receiving treatment for anxiety, depression, or any other mental health problem?' as a measure for a *'general'* mental health condition and 'Are you currently receiving the disability pension on the basis of a psychological or psychiatric illness?' as a measure for a *'severe'* mental health condition. As individuals could answer 'yes' to both mental health questions, resulting variables were not mutually exclusive. Mental health variables were then categorised into a binary variable: none; and any (combining *general* and *severe*) and a three-level variable: none; *general* only; and *severe*. Participants who responded yes to both the general and severe measure were categorised as severe in the three-level variable.

General sociodemographic variables from the survey were included as covariates in analysis. These were sex, age, education, marital status, smoking status and disadvantage quintile; as per the Index of Relative Socio-Economic Disadvantage.[27]

Analysis

Statistical analyses were performed using IBM SPSS Statistics version 25. Chi-square tests of independence were used to compare mental health condition status and drinking at either lifetime or single occasion risk levels. Participants' sociodemographic characteristics were then considered via a series of logistic regression analyses. Separate analyses were carried out for lifetime and single occasion risk as the outcomes, and for each sex (i.e. four analyses). Both univariate (model 1 risky drinking and mental health condition status) and multivariate (model 2 risky drinking, mental health condition, and socio-demographic factors) analyses were performed. Statistical significance was accepted at $p \leq 0.05$. Chi-square test and logistic regressions were stratified by sex due to significant differences in the prevalence of exceeding alcohol guidelines and prevalence of mental health conditions between males and females.

Ethics approval

The questionnaire and methodology for the HOS were approved for years 2014-2017 by The University of Adelaide Human Research Ethics Committee: approval number H-097-2010.

Results

Table 1 presents the sociodemographic characteristics of the HOS sample. The sample had an even distribution of age with a mean age of 47 years (*SD*=19.20). Females made up 50.9% of the sample and were more likely than males to have a certificate/diploma and be divorced, whilst males were more likely to have a trade qualification.

Results showed that 17.3% of participants reported drinking >2 drinks per day on average, levels associated with lifetime risk (Table 1). Further, 13.1% drank four or more drinks on one occasion at least monthly, and 12.9% at least weekly; levels associated with single occasion risk. Among the total sample, 20.2% of participants were abstinent while 10.4% drank at both lifetime risk levels at least weekly and single occasion risk levels on average. Significantly more males than females drank at both risky lifetime: 25.5% vs 9.4% (χ^2(df=1), = 528.81, $p \leq 0.001$) and risky single occasion levels: 18.6% vs 7.5% (χ^2 (df=1), = 317.85, $p \leq 0.001$).

Within the total sample, 12.0% reported being diagnosed or receiving treatment for a mental health condition (general) and 1.8% reported receiving the disability pension for a mental health condition (severe). No mental health condition symptoms were reported in 87.5% of the sample. Prevalence of any mental health condition, (general or severe), was 9.6% among females and 14.7% among males, this difference was statistically significant (χ^2 (df=1), = 71.68, $p \leq 0.001$).

Exceeding drinking guidelines and presence of a mental health condition

Table 2 shows that females with a mental health condition were significantly more likely to be drinking at lifetime risky levels. This relationship was seen when symptoms of

a mental health condition were categorised as both the binary none versus any (p<0.001), and as the three-level variable none, general, severe (p<0.001). Among males, prevalence of lifetime risky drinking was only seen when symptoms of a mental health condition were categorised as the binary none versus any (p=0.05). Prevalence of single occasion risky drinking at least weekly was significantly greater among males with symptoms of a mental health condition (p=0.01) (Table 3). This same relationship was not seen among females with symptoms of a mental health condition.

Mental health condition status as a predictor for lifetime or single occasion risky drinking.

Model 1 of the logistic regression showed, at the univariate level, that having a mental health condition was a significant predictor for drinking at lifetime risk levels for both sexes (Table 4). Males with a mental health condition were 22% more likely to exceed lifetime risk levels and females 59% more likely. In model 2, the addition of sociodemographic covariates resulted in mental health condition status no longer being a predictor for lifetime risky drinking among males, and a reduction of 20% (1.59 to 1.39) in the odds of lifetime risky drinking in females. Those with the greatest odds of putting themselves at lifetime risk were out of school, daily smokers and least disadvantaged. In contrast, females aged 30-44 or 60+ had significantly lower odds of drinking at levels to increase lifetime risk than females aged 15-29 years (reference group).

As seen in Table 5, model 1 demonstrated that, at the univariate level, having a mental health condition was only a significant predictor for single occasion risk drinking (at least weekly) amongst males (OR=1.31, 95% CI: 1.06-1.62). However, the addition of sociodemographic covariates in model 2 meant findings were no longer significant. Presence of a mental health condition was not a significant predictor for females putting themselves at risk of drinking from a single occasion in either model. Similar to the logistic regressions for lifetime risk, being out of school or a daily smoker were the greatest predictors of drinking at levels associated with single occasion risk. Significant predictors for drinking less than four drinks on a single occasion were being a male aged 60 years or older, being a female 30 years or older, and being a married female. In both the lifetime and single occasion risky drinking models confidence intervals for some predictors, such as highest qualification, were too wide to provide robust conclusions.

Table 1: Sociodemographic characteristics by sex among South Australians aged 15 years and over, 2014-2017.[a]

	Total (%) (n=11,761)	Males (%) (n=5,774)	Females (%) (n=5,987)
Age			
15–29	2,751 (23.4)	1,421 (24.6)	1,330 (22.2)
30–44	2,811 (23.9)	1,390 (24.1)	1,422 (23.7)
45–59	2,849 (24.2)	1,395 (24.2)	1,454 (24.3)
60+	3,350 (28.5)	1,568 (27.2)	1,782 (29.8)
Lifetime risky drinking (Guideline 1)			
Abstainers	2,372 (20.2)	988 (17.1)	1,384 (23.1)
≤2 drinks per day on average	7,355 (62.5)	3,316 (57.4)	4,039 (67.5)
>2 drinks per day on average	2,034 (17.3)	1,470 (25.5)	564 (9.4)
Single occasion risky drinking (Guideline 2)			
Abstainers	2,372 (20.2)	988 (17.1)	1,384 (23.1)
Low risk (drinks but never >4 on an occasion)	4,286 (36.4)	1,693 (29.3)	2,593 (43.3)
> 4 drinks at least yearly but not monthly	2,046 (17.4)	1,062 (18.4)	984 (16.4)
> 4 drinks at least monthly but not weekly	1,535 (13.1)	960 (16.6)	575 (9.6)
> 4 drinks at least weekly	1,521 (12.9)	1,071 (18.5)	450 (7.5)
Mental health condition (3 categories)			
No mental health condition	10,296 (87.5)	5,202 (90.4)	5,094 (85.2)
General only	1,229 (10.4)	449 (7.8)	780 (13.1)
Severe (may also include cases with general too)	207 (1.8)	105 (1.8)	102 (1.7)
Mental health condition (2 categories)			
No mental health condition	10,296 (87.5)	5,202 (90.4)	5,094 (85.3)
Combined (general and severe)	1,433 (12.2)	553 (9.6)	880 (14.7)
Highest qualification			
Still at school	480 (4.1)	247 (4.3)	233 (3.9)
Left school before age 15 years	1,041 (8.9)	410 (7.1)	631 (10.6)
Left school after age 15 years	971 (25.3)	1,279 (22.2)	1,692 (28.3)
Trade qualification/ apprenticeship	1,387 (11.8)	1,187 (20.6)	200 (3.3)
Certificate/diploma	2,893 (25.4)	1,267 (22.0)	1,716 (28.7)
Bachelor's degree or higher	2,887 (24.6)	1,381 (23.9)	1,507 (25.2)
Marital status			
Married/De facto	7,283 (61.9)	3,594 (62.3)	3,689 (61.7)
Separated/divorced/ widowed	1,651 (14.0)	571 (9.9)	1,080 (18.1)
Never married	2,814 (23.9)	1,603 (27.8)	1,211 (20.3)
Daily smoker			
Daily smoker	1,546 (13.1)	887 (15.4)	659 (11.0)
Not daily smoker	10,215 (86.9)	4,887 (84.6)	5,328 (89.0)
Disadvantage quintile			
1 (most disadvantaged)	2,894 (24.6)	1,441 (25.0)	1,453 (24.3)
2	1,924 (16.4)	939 (16.3)	985 (16.5)
3	2,144 (18.2)	1,025 (17.8)	1,119 (18.7)
4	2,505 (21.3)	1,235 (21.4)	1,270 (21.2)
5 (least disadvantaged)	2,293 (19.5)	1,133 (19.6)	1,160 (19.4)

Note:
a: Weighted to the South Australian population by age, sex, and geographic area.

Discussion

Prevalence of lifetime risky drinking in this study was comparable to the National Drug Strategy Household Survey (17.3% versus 16.8%).[1] Single occasion risky drinking, however, was approximately 12% below rates reported in the National Drug Strategy Household Survey (13.1% versus 24.8%).[1] Prevalence of a mental health condition was also lower than the prevalence of mental health and behavioural conditions reported in the National Health Survey (12.2% versus 20%).[24] Our study found significant associations between mental health condition status and drinking at levels that increase lifetime or single occasion risk. Consuming >2 drinks per day on average

(lifetime risk) was more prevalent among both males and females with a mental health condition, whilst consuming >4 drinks on one occasion at least weekly (single occasion risk) was greater among males with a mental health condition at the univariate level, but this effect was no longer seen after accounting for sociodemographic factors. A recent study found that among young Australian aged 13-17 years single occasion harmful drinking was significantly associated with mental health concerns, suggesting additional intervention and prevention efforts could be targeted at this age group.[28]

Regarding severity of a mental health condition the risk of exceeding guidelines was higher among males with a severe mental health condition at the univariate level. Males with a severe mental health condition were most likely to drink at quantities associated with lifetime risk, followed by those with a general mental health condition and then no mental health condition. This pattern suggested that severity of a mental health condition may be correlated with drinking at levels associated with lifetime risk at the univariate level, thus putting these individuals at risk of comorbid non-communicable diseases. Males with a severe mental health condition were also most likely to engage in risky single occasion drinking at the univariate level, however, we were unable to assess this in a multivariate model. The same linear pattern was not observed in females, as those with a general mental health condition were most likely to engage in lifetime and single occasion risk drinking. While this study was cross-sectional and causation cannot be determined, risky single occasion drinking combined with a severe mental health condition could further negatively affect an individual's mental health and possible treatment outcomes.[29] As such, comorbid alcohol and mental health concerns have led to a number of individual and structural barriers including patient non-compliance, high-rates of early treatment drop-out and a lack of integrated service and treatment options.[30]

Logistic regression analyses indicated that presence of a mental health condition was a significant predictor for drinking at lifetime risky levels when sociodemographic factors were also included in the model. Females with any mental health condition were 30% more likely to exceed >2 standard drinks on average (lifetime risk) compared to those with no mental health condition. While causation cannot be determined, this could possibly be attributed to the self-medication theory where substances, like alcohol, are used to self-manage mood disorder symptoms.[31,32] This is supported by previous findings where women experiencing psychological distress or negative emotions are more likely to drink heavily as a coping mechanism.[33] A population study in The United States, however, contradicts these findings, as self-medication with alcohol was higher for males with anxiety or personality disorders.[31]

Our study suggests that individuals who exceed NHMRC alcohol guidelines by drinking at levels related to lifetime or single occasion risks, were more likely to have a self-

Table 2: Alcohol consumption at lifetime risk levels by sex and mental health condition status, 2014-2017.[a]

	Males			Females		
	More than 2 standard drinks per day on average (%)	Less than 2 standard drinks per day on average or abstinent (%)	Significance	More than 2 standard drinks per day on average (%)	Less than 2 standard drinks per day on average or abstinent (%)	Significance
Mental health condition (3 categories)						
No mental health condition	1,305 (25.1)	3,896 (74.9)	P=0.12	447 (8.8)	4,647 (91.2)	P<0.001
General only	130 (29.0)	319 (71.0)		105 (13.5)	675 (86.5)	
Severe (may also include cases with general too)	31 (29.5)	74 (70.5)		12 (11.8)	90 (88.2)	
Mental health condition (2 categories)						
No mental health condition	1,305 (25.1)	3,896 (74.9)	P=0.05	447 (8.8)	4,647 (91.2)	P<0.001
Combined (all mental health conditions)	160 (28.9)	393 (71.1)		117 (13.3)	763 (86.7)	
Total	1,470 (25.5)	4,303 (74.5)		564 (9.4)	5,423 (90.6)	

Note:
a: Weighted to the South Australian population by age, sex, and geographic area.

Table 3: Alcohol consumption at single occasion risk levels by sex and mental health condition status, 2014-2017.[a]

	Males			Females		
	More than 4 standard drinks on one occasion at least weekly	More than 4 standard drinks on one occasion less than weekly or abstinent	Significance	More than 4 standard drinks on one occasion at least weekly	More than 4 standard drinks on one occasion less than weekly or abstinent	Significance
Mental health condition (3 categories)						
No mental health condition	943 (18.1)	4,258 (81.9)	P=0.01	377 (7.4)	4,717 (92.6)	P=0.58
General only	94 (20.9)	355 (79.1)		66 (8.5)	714 (91.5)	
Severe (may also include cases with general too)	31 (29.5)	74 (70.5)		8 (7.8)	95 (92.2)	
Mental health condition (2 categories)						
No mental health condition	943 (18.1)	4,258 (81.9)	P=0.01	377 (7.4)	4,717 (92.6)	P=0.35
Combined (all mental health conditions)	125 (22.6)	429 (77.4)		73 (8.3)	806 (91.7)	
Total	1,071 (18.6)	4,303 (74.5)		450 (7.5)	5,537 (92.5)	

Note:
a: Weighted to the South Australian population by age, sex, and geographic area.

Table 4: Logistic regression analysis: significant predictors of drinking, on average, >2 drinks daily (lifetime risk), 2014-2017.[a]

	Males				Females			
	Model 1 OR n= 4,759	95%CI	Model 2 OR n= 4,754	95%CI	Model 1 OR n= 6,971	95% CI	Model 2 OR n= 6,949	95%CI
Mental health condition 2 categories (Ref: no mental health condition)								
Any mental health condition (general or severe)	1.22*	1.00-1.48	0.98	0.80–1.21	1.59***	1.28–1.97	1.39*	1.11–1.75
Age (Ref: 15–29)								
30–44			1.30*	1.04–1.62			0.73*	0.54–1.00
45–59			1.57***	1.25–1.98			1.32	0.99–1.76
60+			1.05	0.83–1.34			0.61*	0.44–0.85
Highest qualification (Ref: still at school)								
Left school before age 15 years			9.93***	4.20–23.48			7.92*	2.04–30.71
Left school after age 15 years			8.30***	3.61–19.09			11.38***	3.07–42.12
Trade qualification/apprenticeship			14.85***	6.43–34.29			20.55***	5.28–79.91
Certificate/diploma			9.06***	3.93–20.91			12.55***	3.38–46.60
Bachelor's degree or higher			7.07***	3.06–16.33			12.49***	3.36–46.44
Marital status (Ref: never married)								
Married/De facto			1.08	0.89–1.32			0.84	0.64–1.11
Separated/divorced/widowed			1.30	0.10–1.69			0.83	0.59–1.18
Daily smoker (Ref: no)								
Yes			2.55***	2.17–3.00			2.39***	1.88–3.03
Disadvantage quintile (Ref: 1 most disadvantaged)								
2			1.29*	1.01–1.50			1.29	0.95–1.744
3			1.46***	1.20–1.76			1.48*	1.11–1.96
4			1.21*	1.00–1.47			1.30	0.97–1.73
5 (least disadvantaged)			1.82***	1.50–2.21			1.98***	1.50–2.61

Notes:

a: Weighted to the South Australian population by age, sex, and geographic area.

****P≤ 0.001, ** P≤ 0.005, *P< 0.05. OR= odds ratio. CI= confidence interval.*

Table 5: Logistic regression analysis: significant predictors of drinking, at least weekly, >4 drinks on one occasion (single occasion risk), 2014-2017.[a]

	Males				Females			
	Model 1 OR n= 4,759	95%CI	Model 2 OR n= 4,754	95%CI	Model 1 OR n= 6,971	95% CI	Model 2 OR n= 6,949	95%CI
Mental health condition 2 categories (Ref: no mental health condition)								
Any mental health condition (general or severe)	1.31*	1.06–1.62	1.07	0.85–1.34	1.14	0.88–1.48	0.92	0.70–1.21
Age (Ref: 15–29)								
30–44			0.94	0.74–1.19			0.53***	0.39–0.72
45–59			1.03	0.80–1.31			0.66*	0.49–0.89
60+			0.50***	0.38–0.66			0.16***	0.10–0.24
Highest qualification (Ref: still at school)								
Left school before age 15 years			10.58***	4.43–25.26			15.65***	3.99–61.46
Left school after age 15 years			9.40***	4.09–21.62			17.95***	4.86–66.22
Trade qualification/apprenticeship			15.56***	6.73–35.99			41.90***	10.84–162.05
Certificate/diploma			7.07***	3.05–16.38			16.94***	4.56–62.91
Bachelor's degree or higher			5.71***	2.46–13.25			14.63***	3.92–54.57
Marital status (Ref: never married)								
Married/De facto			1.01	0.82–1.25			0.76*	0.58–0.99
Separated/divorced/widowed			1.28	0.96–1.71			0.81	0.55–1.20
Daily smoker (Ref: no)								
Yes			2.79***	2.36–3.31			2.64***	2.04–3.40
Disadvantage quintile (Ref: 1 most disadvantaged)								
2			1.18	0.95.47			1.24	0.91–1.69
3			1.43***	1.16–1.77			1.07	0.79–1.45
4			1.19	0.96–1.47			0.94	0.68–1.28
5 (least disadvantaged)			1.55***	1.24–1.93			1.30	0.96–1.77

Notes:

a: Weighted to the South Australian population by age, sex, and geographic area.

****P≤ 0.001, ** P≤ 0.005, *P< 0.05. OR= odds ratio. CI= confidence interval.*

reported mental health condition. Currently, harmful alcohol use is often assessed in the context of an AUD with assessment tools like the 'Alcohol Use Disorders Identification Test' (AUDIT) being used.[34] However, there is also a need to screen and assess harmful alcohol use in the context of greater than guideline drinking (i.e. drinking at lifetime risky levels). This would capture individuals drinking at levels attributable to the significant burden of disease associated with alcohol. To further address the research question and understand the bidirectional nature of alcohol consumption and mental health conditions, future research is needed to clarify whether there are differences between greater than guideline drinking versus drinking at AUD levels among individuals with and without mental health concerns. Doing so would inform future mental health and substance use prevention, intervention, treatment and policy efforts, revealing whether different responses are needed for individuals drinking in excess of recommended alcohol guidelines but not at levels in line with an AUD.

Strengths and limitations

The HOS provided a representative sample of South Australians, with the prevalence of alcohol consumption and a self-reported mental health condition in our study conservative when compared to national findings, indicating results are still likely to be representative across Australia.[1,24] However, some limitations need to be considered. The HOS used face-to-face interviews which may have led to underreporting of drinking behaviours and/or mental health conditions due to fear of judgement.[1,35] Additionally, the questions used to classify mental health condition status did not allow differentiation between types of mental health conditions beyond the general or severe classification, limiting conclusions for illness specific interactions. Furthermore, the mental health measures available in the HOS may not be entirely representative of the experiences of an individual living with a mental health condition and are likely conservative measures for the true prevalence of these concerns. HOS questions were not able to capture individuals with undiagnosed disorders, or those unable to receive the disability pension due to a range of possible factors including insufficient knowledge around funding availability or eligibility, or limited capacity to seek out financial support and complete application requirements. This could be addressed in future studies with specific questions for common mood and personality disorders as well as disability adjusted life years attributable to mental illness. Additionally, this study used an older version of the NHMRC alcohol guidelines which were valid from 2009-2020, during the time of data collection. While recommendations do differ slightly in the updated 2020 guidelines, the 2009 guidelines allowed conclusions to be drawn in relation to both lifetime risky drinking and single occasion risky drinking. The revised 2020 alcohol guidelines are more conservative, recommending no more than 10 standard drinks weekly on average compared to the previous recommendation of no more than two standard drinks per day (i.e. 14 per week).[36] As such our results can still be translated to the context of the current alcohol guidelines with results likely being conservative due to the reduction in the number of standard drinks now recommended. Similarly, alcohol questions in the HOS did not allow for differentiation between greater than guideline drinking (lifetime or single occasion) and AUDs. Although AUDs do encompass lifetime and single occasion risk consumption, looking at whether there are differences within the same population between abstainers, lifetime risky drinkers, single occasion risky drinkers, and AUD in relation to mental health conditions would provide further insights.

Conclusion

Previous studies have confirmed the relationship between AUD and mental illness, while studies looking at the relationship between risky drinking over a lifetime or on a single occasion and mental illness, in an Australian context, are lacking. Our findings suggest there is some evidence for this relationship, particularly in relation to drinking at single occasion risk for males and lifetime risk for females. These findings further highlight the comorbid association between mental health conditions and alcohol consumption, and the merit for integrated alcohol data collection systems and mental health services.

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