

RESEARCH REPORT

# Exploring the relationship between alcohol use and gambling participation and their impacts on associated harms

Short report

March 2023





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# Exploring the relationship between alcohol use and gambling participation and their impacts on associated harms

## Short report

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## At a glance

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This report is based on a subsample of 2,704 Victorian adults who were asked about both their gambling and alcohol use.

In the Victorian population:

- 48.6 per cent of respondents used alcohol in a way that placed them at risk of short- or long-term health and social harm
- 69.1 per cent gambled in the last year
- 43.1 per cent engaged in heavy episodic drinking in the last year, 10% did this monthly and about 7% weekly or daily.

Among Victorians who gambled in the last year (N=1,720):

- About 85.9 per cent report any alcohol use with the AUDIT-C (compared to 81.7 per cent of the total population (N=2,704))
- 31.2 per cent engaged in alcohol use *while* gambling
- 10.4 per cent experienced some harm because of their gambling, such as financial loss or feelings of shame.

Among Victorians who reported any heavy episodic drinking in the last year (N=1,003)

- 47.1 per cent engaged in alcohol use *while* gambling
- 12.7 per cent experienced any harm as a function of their gambling.

Among Victorians who drank while gambling:

- 16.8 per cent experienced any harm as a function of their gambling (compared to 10.4 per cent overall).

This report further details how alcohol use and specific drinking patterns such as heavy episodic drinking (drinking 6+ drinks on one occasion) and alcohol use while gambling were associated with gambling, gambling products and gambling harms. Furthermore, it discusses implications for policy and prevention of gambling-related problems in Victoria.

# Introduction

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Alcohol and gambling are frequently offered in the same venue and hence the practices often co-occur (Pennay et al., 2021). Harmful alcohol use and problem gambling are frequently described as co-morbid disorders (Stewart & Kushner, 2005). In addition, alcohol use often occurs *during* the act of gambling (Rockloff et al., 2020) and has been found to be stimulated by environmental factors in gambling facilities.

This short report explores the relationship between alcohol use and gambling participation and their associated harms in Victoria. Specifically, the aim of the project is to describe the groups most commonly participating in drinking and gambling, study the relationship between alcohol use (heavy episodic drinking and alcohol use while gambling) and gambling participation and harm, and describe this relationship in different demographic and socio-economic populations.

We examined the relationship between:

1. alcohol use and gambling participation for different sociodemographic groups of Victorians
2. alcohol use and gambling participation by focusing on different gambling products and frequency of both drinking and gambling
3. alcohol use and gambling risk categories according to the Problem Gambling Severity Index (PGSI)
4. alcohol use and gambling harm (including highly salient harms) in people who gamble and consume alcohol
5. alcohol use, gambling harm, gambling problems and other comorbid conditions.

## Methods

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The current analyses are conducted with data from the *Victorian Population Gambling and Health Study 2018–2019*. This study aimed to survey gambling problems, gambling harms, attitudes towards gambling and correlates of gambling in Victoria. The study involved 10,638 randomly selected adult participants who completed the core computer-assisted telephone interviews (CATI). The questionnaire was designed by Central Queensland University's Experimental Gambling Research Laboratory. Sub-sample population weights were used to improve the sample's representativeness of the adult population of Victoria, Australia, at the time of the survey.

The current study used secondary data from this large representative survey of the adult population in Victoria, Australia, that focused on gambling, health and wellbeing (Rockloff et al., 2020). For this report, data were used from the 2,704 participating Victorians who were asked additional survey questions, including questions about alcohol use.

### Key measures for this report

- *Demographics*. The participants' gender, age, region of residence in Victoria (Melbourne vs. outside of the capital), language used at home (English vs. another language), and yearly personal income were recorded. Further specifications of response categories were included in Table 1.
- *Alcohol Use Disorders Identification Test (AUDIT-C)*. Respondents who reported drinking in the past 12 months (including those who did and did not report gambling) were asked three questions on their general drinking from the Alcohol Use Disorders Identification Test (the AUDIT-C questions). The AUDIT is a brief screening test of 10 questions to help identify risky drinking and alcohol abuse (alcohol misuse) (Frank et al., 2008). AUDIT-C's three questions ask about the respondent's: 1) Frequency of drinking alcohol in the previous 12 months; 2) Number of alcoholic drinks consumed on a typical day when drinking; and 3) Frequency of consuming six or more drinks (i.e., 60 gm of pure alcohol) on one occasion. The AUDIT-C is scored between 0 and 12, and those scoring 3 or more (women) and 4 or more (men) were categorised as risky drinkers. Those who scored 0 were categorised as non-drinkers, and others scoring below 3 or 4 were categorised as low-risk drinkers.
- *Heavy episodic drinking (HED)*. Respondents who reported drinking in the past 12 months (including gamblers and non-gamblers) were asked the first three Alcohol Use Disorders Identification Test (AUDIT-C) questions. For current analysis, we extracted the frequency of consuming six or more drinks (i.e., 60 gm of pure alcohol) on one occasion [in the previous 12 months]: never, less than monthly, monthly, weekly, or daily (HED). This was dichotomised in some analyses (0=never vs. 1=any HED).
- *Frequency of alcohol use while gambling*. Participants responded to the question "During the past 12 months, how often did you drink alcohol while gambling?" on a 5-point Likert scale from 1 (never) to 5 (always). Those who did not know or refused to answer, were coded as missing (n=4, 0.2%). This was trichotomised (1=never, 2/3=sometimes,



4/5=often or always alcohol while gambling) or dichotomised in several analyses (0= never vs. 1 = any alcohol while gambling).

- *Problem Gambling Severity Index (PGSI)*. To assess the prevalence of problem gambling and associated harms, all respondents who had participated in at least one gambling activity in the last twelve months were asked the nine item Problem Gambling Severity Index (PGSI, Ferris & Wynne, 2001). The PGSI is a subset of questions drawn from the larger Canadian Problem Gambling Index, which is a standardised screening tool that is used widely in international and Australian gambling prevalence surveys. The PGSI contains nine items with response categories between 0 (*never*) and 3 (*almost always*). Sum scores across the 9 items were used to form a risk category score: (0) non-problem gambler, (1–2) low risk gambler, (3–7) moderate risk gambler, or (8–27) problem gambler. In analyses with dichotomous outcomes (e.g., risky gambling vs. any gambling), gamblers who scored anywhere 0-27 were coded as “any gambling”. Those who scored 3-27 were coded as “risky gambling”.

## Analyses

The analyses for this report consist mainly of descriptive statistics such as percentages and means. Weighted data, with the weighted total n set to the sample size of 2,704, were used to adjust the findings to the Victorian population (Rockloff et al., 2020), and the estimates were presented with confidence intervals.

For several research questions, we examined if there were significant differences between groups. For example, to test whether the percentage of those who reported moderate or problem gambling (risky gamblers) is significantly higher in a certain demographic, we calculated confidence intervals. Differences between groups were deemed significant when the confidence intervals do not overlap.

To answer other research questions we conducted logistic regressions, e.g., whether alcohol use is associated with an increased likelihood of experiencing a certain gambling harm. All analyses were conducted in Stata 17 (StataCorp, 2021).

## Results

### 1. What is the relationship between alcohol use and gambling participation for different sociodemographic groups of Victorians?

Participants were divided into four categories based on gambling participation in the last year and whether they engaged in any heavy drinking in the last year (Table 1). Subsequently, we looked at the results for subgroups of Victorians defined by gender, age group, geographic region (Melbourne or regional Victoria), language spoken at home, and income level (Table 2).

**Table 1. Four categories based on gambling (yes/no) and heavy episodic drinking (yes/no) in the last year.**

Category	Gambling in last year	Heavy episodic drinking (HED)
A	No	No
B	Yes	No
C	No	Yes
D	Yes	Yes

Table 2 shows that 33 per cent of Victorians reported both gambling and heavy episodic drinking in the last year. The table further shows the proportion of each group as a function of sociodemographic variables. Confidence intervals were used to test which categories differed significantly from the reference group (the first category of each variable). This was done to determine which sociodemographic and geographic factors were associated with being in the gambler and risky alcohol use group [Category D].

The results show that:

- more women (44 per cent) than men (28 per cent) were in the gambling, no heavy episodic drinking group
- fewer women (24 per cent) than men (42 per cent) were in the gambling and heavy episodic drinking group
- more 35+ year-olds were in the gambling and no heavy episodic drinking group (35-58 per cent) than 18–34 year-olds (18 per cent)
- more 18–34 year-olds were in the heavy episodic drinking and non-gambling group (35-58 per cent) compared to 35+ year-olds (22 per cent)
- more individuals from younger age groups both gamble and undertake heavy episodic drinking (33-39 per cent) compared to 65+ year-olds (16 per cent)
- more Melburnians were in the non-gambling and no heavy episodic drinking category (22 per cent) compared to regional Victorians (16 per cent). No other differences were found based on geographic location

- more individuals from English speaking families (37 per cent) were in the gambler and heavy episodic drinking group compared to individuals from non-English speaking families (17 per cent). Those from English speaking families were also less likely to be in the non-gambling, no heavy episodic drinking category compared to those from non-English speaking families
- more individuals with higher incomes were in the gambling and heavy episodic drinking group (38-45 per cent) compared to those with lower incomes (26 per cent). Note: 622 participants had missing data on their income level and therefore could not be included in the analysis.

**Table 2. Gambling and heavy episodic drinking (HED) by sociodemographic variables, weighted percentages, and confidence intervals.**

	N	Non-gambling, Non-HED or no drinking	Gambling, Non-HED or no drinking	Non-gambling, HED	Gambling, HED
Total	2,672	20.6% (18.7, 22.7)	36.3% (33.3, 39.4)	10.3% (8.9, 11.9)	32.8% (29.7, 36.0)
<b>Gender</b>					
Male	1,345	18.4% (15.9, 21.2)	28.1% (24.3, 32.2)	11.7% (9.6, 14.1)	41.8% (37.5, 46.3)
Female	1,327	22.7% (19.9, 25.9)	44.1% (39.7, 48.6)*	9.0% (7.2, 11.2)	24.1% (20.1, 28.7)*
<b>Age group</b>					
18-34	617	23.5% (19.7, 27.9)	18.2% (13.7, 24.8)	19.6% (16.2, 23.7)	38.8% (32.9, 44.7)
35-49	500	17.2% (13.5, 21.6)	34.9% (28.2, 42.3)*	9.1% (6.4, 12.7)*	38.8% (31.9, 46.1)
50-64	692	17.2% (14.0, 20.9)	43.5% (37.8, 49.4)*	6.1% (4.4, 8.4)*	33.1% (27.5, 39.3)
65+	863	24.5% (20.9, 28.5)	57.5% (52.2, 62.6)*	2.4% (1.5, 3.7)*	15.6% (12.0, 20.1)*
<b>Geographic</b>					
Melbourne	2,031	22.0% (19.72, 24.5)	36.1% (32.7, 39.7)	10.5% (8.9, 12.4)	31.3% (27.8, 35.0)
Regional	641	16.0% (12.9, 19.70)*	36.7% (30.9, 42.9)	9.6% (7.1, 12.8)	37.7% (31.6, 44.2)
<b>Language spoken at home</b>					
English	2,104	15.9% (14.1, 18.0)	36.7% (33.2, 40.2)	10.1% (8.6, 12.0)	37.2% (33.7, 41.0)
Non-English	565	36.9% (31.5, 42.7)	34.7% (28.7, 41.3)	11.0% (8.1, 14.8)	17.4% (12.7, 23.3)*
<b>Income level</b>					
Low	1,070	25.1% (21.7, 28.9)	37.3% (32.4, 42.3)	11.8% (9.4, 14.7)	25.8% (21.3, 30.9)
Middle	485	18.9% (14.8, 23.9)	30.6% (24.2, 37.8)	12.1% (8.9, 16.4)	38.3% (31.5, 45.6)*
High	495	10.6% (8.0, 13.9)	34.2% (27.9, 41.1)	10.2% (7.4, 14.1)	45.0% (38.0, 52.1)*
Note: *Significant differences were indicated where confidence intervals do not overlap ( $p < .05$ ).					

## 2. What is the relationship between alcohol use, gambling harm, and gambling problems?

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To investigate the relationship between alcohol use, problem gambling and gambling harm, three logistic regressions were conducted. We looked at bivariate logistic analyses and multivariable logistic regressions, i.e., while controlling for sociodemographic variables.

### Key findings:

First, we examined the association between heavy episodic drinking (HED) and any gambling (vs. no gambling). Results are shown in Table S1.

- Participants who occasionally reported heavy episodic drinking were 1.7 times more likely to report any gambling (vs. no gambling).
- Participants who reported heavy episodic drinkers monthly were 3.1 times more likely to report any gambling (vs. no gambling).

Second, we tested the association between heavy episodic drinking and alcohol use while gambling with risky gambling (vs. any gambling). Results are shown in Table S2a.

- Participants who reported heavy episodic drinking weekly or daily were 2.3 times more likely to report risky gambling (vs. any gambling) – also when controlling for alcohol use while gambling.
- Those who reported drinking alcohol while gambling sometimes (2.5 times more likely) and often (4.3 more likely) were both more likely to report risky gambling (vs. any gambling), - also when controlling for heavy episodic drinking.
- We further examined whether the combination of heavy episodic drinking and alcohol use while gambling was associated with risky gambling, which showed that participants who engaged in both were at 3.2 times more likely to engage in risky gambling (Table S2b).

Third, we examined whether heavy episodic drinking and alcohol use while gambling were associated with experiencing gambling harm (vs. no harm). Results are shown in Table S3.

- Alcohol use while gambling (but not heavy episodic drinking) was directly associated with a higher likelihood of experiencing gambling harm (vs. no harm).

More detailed descriptions of the findings and the statistics can be found in Tables S1, S2a, S2b, and S3 in the supplements.

### 3. What is the relationship between alcohol use and gambling participation by gambling product and frequency?

For each gambling product (e.g., playing the pokies, betting on Keno), we examined how many of its users engaged in the following alcohol use patterns: a) Heavy episodic drinking at least sometimes over the last year, and b) alcohol use while gambling.

Bivariate logistic regressions were used to investigate whether involvement in each gambling product in the last year (yes vs. no) was associated with a higher likelihood of reporting heavy episodic drinking or using alcohol while gambling.

Of the total population who gambled, about 43% engaged in heavy episodic drinking and 31% engaged in alcohol use while gambling in the last year. These percentages vary strongly by the type of gambling product, which is also reflected in the odds ratios below (Table 3).

Involvement in specific gambling products was associated with both heavy episodic drinking and alcohol use while gambling – particularly with the latter. For example, those who use EGMs were more than twice as likely to drink in a heavy episodic way (and almost 10 times more likely to drink while gambling) compared to those who do not use EGMs. As these are cross-sectional relationships, this can also be interpreted in the opposite direction, that is, people who drink in a heavy episodic way were more likely to use EGMs, etc.

**Table 3. Logistic regression of the relationship between alcohol use (heavy episodic drinking and any alcohol use during gambling) and gambling product.**

	Victorians that use product		Among users of gambling product:			
	N	%	A) Heavy episodic drinking (vs. no)		B) Alcohol while gambling (vs. no)	
			%	OR <sup>^</sup>	%	OR <sup>^</sup>
Total	2,672		43.1%		31.2%	
Informal private betting	116	4.3%	85.1%	7.97***	82.1%	11.40***
Playing pokies or electronic gaming machines	578	21.2%	60.7%	2.30***	71.6%	9.70***
Betting on casino table games such as blackjack, roulette, and poker	184	6.9%	79.5%	5.62***	80.4%	11.42***
Betting on horse or harness racing or greyhounds	563	21.1%	64.7%	2.94***	67.0%	8.69***
Betting on sports	192	7.2%	78.2%	5.14***	76.9%	8.86***
Betting on Keno	124	4.6%	71.9%	3.50***	69.3%	5.42***

	Victorians that use product		Among users of gambling product:			
	N	%	A) Heavy episodic drinking (vs. no)		B) Alcohol while gambling (vs. no)	
			%	OR <sup>^</sup>	%	OR <sup>^</sup>
Australian lotteries	1,196	45.0%	48.7%	1.47**	29.4%	0.79
Scratch tickets	358	13.4%	51.5%	1.47	41.4%	1.72*
Betting on bingo	67	2.5%	55.0%	1.62	45.9%	1.91
Entry for a prize-draw competition by phone where there was a phone-charge for entry	80	3.0%	31.9%	0.62	32.3%	1.05
Raffle tickets, sweeps or other competitions	936	35.3%	48.4	1.48**	31.9	1.07

Note. <sup>^</sup>OR = odds ratio; \*\*\* $p < .05$ ; \*\*  $p < .05$ ; \* $p < .05$ .

## 4. What is the relationship between alcohol use categories and PGSI gambling risk categories?

We examined how many Victorians reported gambling risk as a function of alcohol use. This was done by a) examining the proportion of Victorians in each of the PGSI risk categories as a function of their AUDIT-C score. A similar analysis examined how many Victorians were in the PGSI risk categories as a function of b) heavy episodic drinking and c) alcohol *while* gambling.

### a) AUDIT-C and gambling risk

Results show that risky alcohol use (scores >2 for women, >3 for men on the AUDIT-C) compared with abstinence is associated with a higher percentage of individuals reporting (problem) gambling risk gambling (Table 4a). Conversely, those who were abstinent were at lower risk of being a (problem) gambler Specifically:

- significantly lower percentages of gamblers (12-14 per cent) were abstinent compared to non-gamblers (28 per cent)
- a higher percentage of at-risk drinkers were gamblers (54-65 per cent) than non-gamblers (36 per cent).

**Table 4a. PGSI gambling risk categories by AUDIT-C risk categories, weighted percentages and confidence intervals.**

	Non gambler (a)	Non-problem gambler (b)	Low risk gambler (c)	Moderate risk gambler (d)	Problem gambler (e)
Total N	952	761	673	217	69
% by AUDIT category:					
Non-drinking (abstinence)	27.6% <sup>b,c,d,e</sup> (24.1, 31.3)	14.3% <sup>a</sup> (11.5, 17.7)	12.8% <sup>a</sup> (10.1, 16.2)	14.4% <sup>a</sup> (9.7, 20.7)	12.1% <sup>a</sup> (6.1, 22.8)
Low risk drinker	36.5% <sup>d</sup> (32.7, 40.5)	31.9% (27.7, 36.4)	32.1% (27.8, 36.7)	24.6% <sup>a</sup> (18.4, 31.9)	23.0% (12.9, 37.6)
At risk drinker	35.9% <sup>b,c,d,e</sup> (32.1, 39.9)	53.8% <sup>a</sup> (49.1, 58.5)	55.1% <sup>a</sup> (50.3, 59.8)	61.1% <sup>a</sup> (53.1, 68.5)	64.8% <sup>a</sup> (50.2, 77.2)

Note: Significant differences between columns were indicated with superscripted letters ( $p < .05$ ).

b) *Heavy episodic drinking and gambling risk*

Of individuals who do not engage in HED, a significantly lower percentage were in each gambling risk group (37-54 per cent) compared to non-gamblers (67 per cent), see Table 4b.

- Conversely, a significantly higher percentage of people reporting HED were found among those who identified as gamblers (46-63 per cent) compared to non-gamblers (33 per cent)
- Moreover, a significantly higher percentage of people reporting HED were low-risk (58 per cent) or moderate risk gamblers (62 per cent), compared to non-problem gamblers (46 per cent). The difference between non-problem gamblers (46 per cent) and problem gamblers (63 per cent) was not significant since the confidence intervals overlapped.

**Table 4b. PGSI gambling risk categories by heavy episodic drinking (HED) frequency, weighted percentages and confidence intervals.**

	Non gambler (a)	Non-problem gambler (b)	Low risk gambler (c)	Moderate risk gambler (d)	Problem gambler (e)
Total N:	952	761	673	217	69
% by HED:					
Never	66.7% <sup>b,c,d,e</sup> (62.6, 70.5)	54.4% <sup>c,d</sup> (49.6, 59.2)	42.1% <sup>a,b</sup> (37.5, 47.8)	38.5% <sup>a,b</sup> (31.1, 46.5)	37.0% <sup>a</sup> (24.4, 51.6)
Sometimes or often	33.3% <sup>b,c,d,e</sup> (29.5, 37.4)	45.6% <sup>a</sup> (40.8, 50.4)	57.9% <sup>a</sup> (53.2, 62.5)	61.5% <sup>a</sup> (53.5, 68.9)	63.0% <sup>a</sup> (48.4, 75.6)

Note: Significant differences between columns were indicated with superscripted letters ( $p < .05$ ).

c) *Alcohol use while gambling and gambling risk*

For alcohol use while gambling, we can only compare between non-problem gamblers and at risk (low-risk, moderate-risk, and problem) gamblers.

- Of individuals who do not engage in alcohol while gambling, a significantly lower percentage were in the risky and problem gambling groups (38-50 per cent), compared to non-problem gamblers (Table 4c).
- Conversely, a significantly higher percentage of people reporting alcohol while gambling were found among those who identified as risky and problem gamblers (50-62 per cent) compared to non-problem gamblers (28 per cent).

**Table 4c. PGSI gambling risk categories by drinking while gambling frequency, weighted percentages and confidence intervals.**

% by alcohol while gambling	Non gambler (a)	Non-problem gambler (b)	Low risk gambler (c)	Moderate risk gambler (d)	Problem gambler (e)
Never	-	72.4% <sup>c,d,e</sup> (67.8, 76.5)	50.1% <sup>a</sup> (45.3, 54.9)	41.7% <sup>a</sup> (34.0, 49.8)	37.9% <sup>a</sup> (24.8, 53.1)
Sometimes or often	-	27.6% <sup>c,d,e</sup> (23.5, 32.2)	49.9% <sup>a</sup> (45.1, 54.7)	58.3% <sup>a</sup> (50.2, 66.0)	62.1% <sup>a</sup> (46.9, 75.2)

Note: Significant differences between columns were indicated with superscripted letters ( $p < .05$ ).

## 5. What is the relationship between alcohol use and gambling harm in people who gamble and consume alcohol?

For this research question, only those who gambled in the last year were selected (N=1,720). Bivariate logistic regressions were used to indicate the likelihood of specific harms as a function of low-risk and risky alcohol use. Non-drinkers were the reference group.

In general, the results show that the dichotomised heavy episodic drinking and drinking alcohol while gambling are not associated with a higher likelihood of experiencing harm (Table 5). These results are similar to Table S4 (using non-dichotomised variables), except that alcohol use while gambling appeared significantly associated with experiencing any gambling harm.

When we examine separate harms, we find that individuals who engaged in heavy episodic drinking, or who used alcohol while gambling, were more likely to experience *specific* harms from gambling compared to those who do not engage in HED or did not drink while gambling. For example:



- spending less on recreational expenses was 2.2 times more likely among heavy episodic drinkers and 4.1 times more likely among those who use alcohol while gambling
- those who drink while gambling were about 4 times more likely to spend less time with people they care about.

For highly salient harms, results show that significantly more individuals who engage in risky drinking experienced one type of highly salient harm from gambling: for instance, spending less on essential expenses such as medication. Note: due to low Ns, results here should be interpreted with care.

**Table 5. Odds ratios showing the likelihood of specific gambling harm among those gambling in the past year, as a function of HED and alcohol use while gambling.**

	Specific harms mentioned		Likelihood to experience harm as function of specific forms of alcohol use	
	N	Weighted proportion of those gambling <sup>a</sup>	A) Heavy episodic drinker (vs. no)	B) Alcohol while gambling (vs. no)
	1,720		OR	OR
<b>Any harm (no vs. yes)</b>	414	10.4%	1.60	1.17
<b>Specific harm outcome (no vs. yes)</b>				
a) reduction of available spending money	234	6.1%	2.20*	2.58**
b) reduction of savings	184	4.8%	0.73	1.81
c) less spending on recreational expenses	128	2.4%	2.24**	4.08***
d) feeling sorry about gambling	187	3.5%	2.43**	4.79***
e) felt ashamed of gambling	123	2.0%	2.03**	3.78***
f) sold personal items	18	0.34%	6.77***	8.24**
g) increased credit card debt	36	0.93%	0.62	1.57
h) spent less time with people you care about	65	1.1%	1.33	3.90***
i) felt distressed about gambling	92	1.4%	1.42	2.59**
j) felt like a failure	91	1.5%	2.15**	4.14***
<b>Salient harm (no vs. yes)</b>				
k) spent less on essential expenses (e.g. medication)	44	1.16	2.80*	2.46
l) experienced greater conflict in relationships	48	0.85	2.08*	4.05***

Note. <sup>a</sup> Proportions are weighted – it appears that those with harms are oversampled compared to the population, which therefore may not correspond with the unweighted Ns; \*\*\* $p < .05$ ; \*\* $p < .05$ ; \* $p < .05$

## Conclusions

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The findings of this report indicate that alcohol use is associated with gambling in general, but also with specific gambling products. Various ways of gambling were associated with engagement in heavy episodic drinking (6+ drinks in a single occasion) and with alcohol use while gambling. Both drinking patterns were associated with the experience of specific gambling-related harms.

For instance, the findings in Table 3, on strong relations of drinking variables with particular forms of gambling, and in Table 5, on involvement of drinking while gambling etc, with specific harms from gambling, both point to a need for more detailed studies of the relationships, and maybe to a need for trials for policies that would discourage the linking of drinking and risky gambling.

Concerning drinking's relation to gambling, we showed results for HED and for drinking while gambling because these are the two dimensions of drinking behaviour available in the dataset which seem most related to problematic gambling. While there may be other relevant aspects of drinking (including such things as commensality), it is the intoxication function – interfering with reasoning and judgement, focusing on the moment, and blocking out thoughts about consequences, etc. – which is the primary issue for effects on gambling behaviour. So what matters is willingness to get intoxicated and effects-in-the-gambling-moment.

Given the high co-occurrence of alcohol use, gambling, and gambling-related harms, there are significant opportunities for prevention. The findings that heavy episodic drinking and alcohol use while gambling are associated with risky gambling and gambling harm provide specific implications for prevention. For example, recommendations could be introduced to:

- prohibit gambling facilities, such as casinos and hotels, from serving alcohol for free or at greatly reduced prices
- inform people who gamble of the risks associated with drinking while gambling, e.g., by posting warnings or guidelines about these risks in gambling establishments and /or as part of risk reducing media, advertising, and marketing campaigns
- train bar staff in responsible service and including guidance on how not serving inebriated patrons could reduce risky gambling behaviour
- strengthen cross-collaborations and referral pathways between gambling and addiction treatment services.

The reported findings on the association between alcohol use and gambling problems and harm warrant further research. For example, we have shown that both heavy episodic drinking and drinking while gambling increased the probability of risky and problem gambling.

Future studies should determine the contexts and mechanisms behind how heavy episodic drinking *while* gambling affects risky gambling. Moreover, more research is needed to determine whether the combination of alcohol use and gambling affect close (significant) others.

Greater insight into alcohol use and particular and various gambling products would additionally assist the development and targeting of strategies for prevention to reduce risky gambling and gambling harm in Victoria.

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## Supplements

### Supplement 1: Unadjusted and adjusted odds of any gambling, risky gambling, and gambling harms by alcohol use.

Table S1 shows estimates of whether frequency of heavy episodic drinking (6+ drinks) and sociodemographic variables are associated with the odds of any gambling vs. no gambling. Bivariate logistic regression analyses show that all categories of heavy episodic drinking more likely to engage in any gambling, as compared to the reference group (no heavy episodic drinking). This association remained when controlling for sociodemographic variables in the multivariable analysis.

**Table S1. Unadjusted and adjusted odds of gambling (none versus any) by alcohol use and sociodemographic characteristics.**

None vs. Any gambling (weighted)		Bivariate logistic regression	Multivariable logistic regression			
	N	Unadjusted OR	Adjusted OR	95% CI		P
All Victorian adults	2,672					
<b>Gender</b>						
Male	1,345	1.00				
Female	1,327	0.92	1.10	0.86	1.42	.445
<b>Age</b>						
18-34	617	1.00				
35-49	500	2.13***	2.07***	1.42	3.02	<.001
50-64	692	2.50***	2.52***	1.78	3.57	<.001
65+	863	2.07***	2.55***	1.78	3.66	<.001
<b>Region in Victoria</b>						
Melbourne	2,031	1.00				
Regional	641	1.40*	1.07	0.83	1.51	.439
<b>First language at home</b>						
English	2,104	1.00				
Other	565	0.38***	0.53***	0.39	0.73	<.001

None vs. Any gambling (weighted)		Bivariate logistic regression	Multivariable logistic regression			
	N	Unadjusted OR	Adjusted OR	95% CI		P
<b>Personal income, per year</b>						
Nil - \$41,599	1,070	1.00				
\$41,600 - \$77,999	485	1.29	1.24	0.88	1.77	.222
\$78,000 or more	495	2.23***	1.81**	1.25	2.61	.002
Missing	622	1.22	1.08	0.77	1.5	.667
<b>Heavy episodic drinking</b>						
Never	1,669	1.00				
Less than monthly	560	1.60**	1.74**	1.26	2.43	.001
Monthly	264	2.60***	3.13***	1.94	5.07	<.001
Weekly or daily	179	1.70*	1.67	0.98	2.84	.060

Table S2a presents information on bivariate and multivariable logistic regressions of alcohol use with risky gambling vs. any gambling. The results show that those with a drinking pattern of weekly heavy episodic drinking (vs. less frequent or no heavy episodic drinking) and those reporting alcohol use during gambling (vs. no alcohol while gambling) were at higher odds of being risky gamblers.

**Table S2a. Unadjusted and adjusted odds of risky gambling, among those gambling at all, by alcohol use and sociodemographic characteristics.**

Some vs. risky gambling (weighted)	Bivariate logistic regression		Multivariate logistic regression			
	N	Unadjusted OR	Adjusted OR	95% CI		P
<b>All Victorian adults</b>	1,720					
<b>Gender</b>						
Male	902	1.00	1.00			
Female	818	0.66***	0.52**	0.35	0.79	.002
<b>Age</b>						
18-34	343	1.00	1.00			
35-49	347	0.57**	0.90	0.53	1.50	.677
50-64	472	0.49**	0.69	0.41	1.16	.164
65+	558	0.36***	0.56*	0.33	0.96	.033
<b>Region in Victoria</b>						
Melbourne	1,289	1.00	1.00			
Regional	431	0.85	0.74	0.45	1.23	.259
<b>First language at home</b>						
English	1,407	1.00	1.00			
Other	311	1.84**	1.91*	1.16	3.12	.011
<b>Personal income, per year</b>						
Nil - \$41,599	668	1.00	1.00			
\$41,600 - \$77,999	331	1.04	0.75	0.46	1.26	.259
\$78,000 or more	353	0.62*	0.42**	0.24	.72	.002
Missing	368	0.52**	0.44**	0.25	0.76	.003

Heavy episodic drinking (HED)							
Never	974	1.00					
Less than monthly	397	1.04		0.69	0.42	1.12	.132
Monthly	211	2.03**		0.90	0.49	1.67	.738
Weekly or daily	138	4.80***		2.25**	1.22	4.15	.009
Drinking alcohol during gambling							
Never	1,076	1.00		1.00			
Sometimes	429	2.49***		2.49***	1.56	3.96	<.001
Often/always	211	5.32***		4.29***	2.53	7.26	<.001

For this, we dichotomised HED and alcohol use while gambling (no vs. any HED/alcohol use while gambling). The results showed some evidence that the combination was associated with a 3.2 times higher likelihood of risky gambling, over and above engaging in either HED OR alcohol use while gambling (Table S2b).

**Table S2b. Interaction of heavy episodic drinking (HED) and alcohol while gambling with risky gambling (vs. any gambling).**

	HED	Alcohol use while gambling	Low risk gamblers	High risk gamblers	OR of interactions [95% CI]	p
			N=1,431	N=285	N=1,716	
1	No	No	47.3%	35.1%	1.00	--
2	Yes	No	18.9%	11.6%	0.65 [0.36-1.16]	.145
3	No	Yes	11.4%	13.0%	2.07 [1.14-3.73]	.016
4	Yes	Yes	22.7%	40.4%	3.16 [1.98-5.41]	.035
<p><i>Note.</i> Rates of risky gambling among individuals grouped based on HED (yes/no) and alcohol use while gambling (yes/no); Sociodemographic variables (gender, age, region in Victoria, first language at home and personal income) were controlled in the interaction analysis.</p>						

Table S3 presents information on bivariate and multivariable logistic regressions of alcohol use with gambling harm vs. no harm. The results show that those with a drinking pattern of weekly heavy episodic drinking (vs. less frequent or no heavy episodic drinking) and those reporting alcohol use during gambling (vs. no alcohol while gambling) were at higher odds of experiencing any harm.

**Table S3. Unadjusted and adjusted odds of gambling harm, among those gambling at all, by alcohol use and sociodemographic characteristics.**

Some vs. risky gambling (weighted)	Bivariate logistic regression		Multivariate logistic regression			
	N	Unadjusted OR	Adjusted OR	95% CI		P
<b>All Victorian adults</b>	1,720					
<b>Gender</b>						
Male	902	1.00	1.00			
Female	818	0.66	0.76	.46	1.25	.300
<b>Age</b>						
18-34	343	1.00	1.00			
35-49	347	0.77	.95	.48	1.90	.754
50-64	472	0.46**	.52*	.27	.99	.048
65+	558	0.34**	.48*	.21	1.10	.015
<b>Region in Victoria</b>						
Melbourne	1,289	1.00	1.00			
Regional	431	0.66	0.64	0.35	1.15	.135
<b>First language at home</b>						
English	1,407	1.00	1.00			
Other	311	1.23	1.27	0.65	2.50	.473



Some vs. risky gambling (weighted)	Bivariate logistic regression		Multivariate logistic regression			
	N	Unadjusted OR	Adjusted OR	95% CI		P
<b>Personal income, per year</b>						
Nil - \$41,599	668	1.00	1.00			
\$41,600 - \$77,999	331	.72	.55*	.33	.95	.030
\$78,000 or more	353	1.31	1.00	.55	1.81	.996
Missing	368	.42	.38**	.20	.73	.004
<b>Heavy episodic drinking</b>						
Never	974	1.00	1.00			
Less than monthly	397	1.26	.82	.46	1.48	.508
Monthly	211	1.53	.81	.34	1.92	.635
Weekly or daily	138	3.26	1.77	.58	5.40	.317
<b>Drinking alcohol during gambling</b>						
Never	1,076	1.00	1.00			
Sometimes	429	2.19**	2.29**	1.22	4.30	.010
Often/always	211	3.06***	2.47*	1.21	5.01	.013

RESEARCH REPORT

# Exploring the relationship between alcohol use and gambling participation and their impacts on associated harms

Short report

March 2023

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