



Exposure to gambling promotions and gambling behaviours in Australian secondary school students

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ABSTRACT

Background: Young people's gambling behaviours are associated with a range of individual, interpersonal and community factors. This study explored the association between exposure to types of gambling advertising and promotions and adolescent gambling behaviours.

Methods: Students from two states answered gambling questions as part of the 2017 Australian Secondary Students' Alcohol and Drug (ASSAD) Survey. Students reported gambling behaviours (gambling in the last month, types of gambling activities), exposure to gambling promotions during the last 30 days (e.g. ads for gambling on TV, online, live studio crosses), and were assessed for problem gambling. Principal Component Analysis suggested four groups of gambling promotion exposure. Logistic regression analyses examined the association between gambling promotion exposure and student gambling, engagement in hard gambling activities in the last month, and problem or at risk gambling, controlling for a range of student characteristics.

Results: Most students (81%) had been exposed to some form of gambling promotion or advertisement in the last month, most commonly TV, social media and sporting event advertisements. Exposure to online gambling ads (including websites, pop-ups on websites, and social media) in the last month was significantly associated with gambling in the last month, and being classified as an at risk or problem gambler; but not with participating in hard gambling activities. After adjusting for exposure to gambling advertising across categories, no other advertising exposure types were associated with adolescent gambling behaviours.

Conclusions: Study findings point to the need to impose restrictions on gambling advertisements and promotions, particularly those presented online.

1. Background

Despite legal restrictions on underage gambling, across jurisdictions most adolescents report having gambled at some point during their lifetime (Calado et al., 2017). Review evidence from various countries suggests that between 40% and 80% of youth have gambled in the past year, with 0.2–12.3 % of youth experiencing gambling-related problems

(Calado et al., 2017). Adolescent gambling has been associated with a range of harms, including missing or dropping out of school; family disruptions; and substance use (Derevensky and Gupta, 2004; Fisher, 1999; Gupta and Derevensky, 1998; Huang et al., 2007; Yeoman and Griffiths, 1996).

Along with the well-acknowledged influence of family, social and cultural norms on adolescent's gambling, (Delfabbro and Thrupp, 2003)

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other factors within a young person's environment may also influence gambling behaviours (Messerlian et al., 2005; Shaffer, 2003). One key environmental factor is media promotion and advertising of gambling (Derevensky et al., 2010). Young people are increasingly exposed to messages from a broad range of media which endorse, promote, and glamorise gambling (Parrado-González and León-Jariego, 2020). Gambling advertising takes many forms beyond traditional modalities of television, radio, and print ads (Friend and Ladd, 2009). Gambling industries sponsor professional athletes, sports teams, celebrities, and popular events such as sporting and racing events (Friend and Ladd, 2009). In addition, smartphones, apps and social media have vastly expanded the gambling industry's marketing possibilities and reach (Victorian Responsible Gambling Foundation, 2021). Expenditure on gambling advertising also appears to be increasing. In Australia for example, expenditure on gambling advertising more than tripled between 2011 and 2020 to over \$270 million (excluding social media, sponsorships and in-program content) (Victorian Responsible Gambling Foundation, 2021). Advertising expenditure increases are seen internationally including in the UK, Sweden, Canada and Spain (Parrado-González and León-Jariego, 2020; Torrance et al., 2021).

The powerful impact of advertising on children and adolescents' health behaviours has been examined in domains including alcohol, tobacco, and junk food consumption (Russell et al., 2019; Weitzman and Lee, 2020). However, there has been surprisingly little research examining the potential impact of gambling advertisements on young people's gambling behaviour, particularly in the last 10 years when such advertising has proliferated (Labrador et al., 2021). The existing research suggests that adolescent exposure to advertising is associated with an increase in the likelihood of engaging in gambling activities (Abdi et al., 2015; Freund, Noble, Hill, White, Evans, et al., 2022; Hayer et al., 2018; Kristiansen & Severin-Nielsen, 2021; Parrado-González and León-Jariego, 2020). For example, in a 2018 sample of 1,174 Spanish 12 to 20 year-olds, overall exposure to gambling advertising across different media, ranging from low to high exposure, was found to be associated with gambling frequency and problem gambling (Parrado-González and León-Jariego, 2020). Similarly, in a sample of 6377 Australian adolescents aged 12–17 years of age, exposure to one additional type of gambling advertisement was associated with a 6% increase in the odds of gambling in the last month and a 10% increase in the odds of being classified as a problem or at risk gambler (Freund, Noble, Hill, White, Evans, et al., 2022).

Few studies have examined how adolescents are exposed to gambling advertisements (e.g. through television, social media, or at sporting events) (Djohari et al., 2019; Labrador et al., 2021). A 2019 UK study of 99 young people (8–16 years) attending community events such as festivals and football tournaments, found the most often recalled gambling promotion was on television (79%), technology/screens (49%), in association with sports teams (43%), billboards (38%), sports stadiums (36%) and social media (35%) (Djohari et al., 2019). The previously mentioned Australian study found adolescents saw on average four different types of gambling advertisements a month (e.g. ads on television, online, billboards etc.) (Freund, Noble, Hill, White, Evans, et al., 2022). To our knowledge, no study has examined the relative association of exposure to different types of gambling advertisement and adolescent gambling behaviour. This type of information would provide important intelligence to policy and decision makers. Given the expansion of gambling advertising and promotion across multiple platforms, the present study aimed to explore the relative associations between exposure to different types of gambling advertisement and the prevalence of gambling in the last month, problem and at risk gambling, and type of gambling activities among a sample of Australian adolescents.

2. Methods

Details on the study methodology have been published elsewhere

(Freund, Noble, Hill, White, Evans, et al., 2022). A brief overview is presented below.

2.1. Study design

Gambling questions were included in the cross-sectional triennial Australian Secondary Students' Alcohol and Drug (ASSAD) Survey for the states of Victoria and Queensland in 2017. A random sample of schools, stratified by education sector, was developed for each participating state. The Australian education sector comprises Government and non-Government (Catholic and Independent) schools. Independent schools include those affiliated with non-Catholic religions (Independent Schools Australia, 2022). Ethics approval was granted by the relevant State and institutional Human Research Ethics Committees (HRECs), including the University of Newcastle HREC (Ref: H-2017-0102).

2.2. Sample and procedure

Within participating schools, classes of students in Years 7 to 12 were randomly selected to complete the ASSAD survey. Researchers attended the school to administer the pencil-and-paper questionnaire to selected classes. Further details regarding the ASSAD sample selection process and data collection/analysis procedures (including use of weights to account for over-sampling) have been published elsewhere (Guerin & White, 2018).

2.3. Measures

Gambling items were developed through an iterative process including an extensive literature review, advice from experts in adolescent youth gambling and smoking research, and pilot testing of items with a group of adolescents ($n = 10$) (Freund, Noble, Hill, White, Evans, et al., 2022). Prior to answering the gambling-related questions, students were given the following definition of gambling: 'Gambling is when you pay in your own money knowing that you could lose all of it or, possibly, win back even more than you paid in. There are lots of ways to gamble, for example on the results of races, sports, card games, lotteries, raffles, on machines like "pokies", tipping competitions and sweepstakes.'

2.3.1. Ever gambled and gambled in the last 30 days

Students were asked 'Have you ever bet any money on any form of gambling?' (yes/no). Students who answered in the affirmative were asked if they had gambled in the past 30 days (yes/no).

2.3.2. Other people's gambling

Students were asked to select any people they knew who had gambled in the last 30 days including: mother/caregiver, father/caregiver, brother or sister, other relative, one of your best friends, someone else you know. A variable called "number of known gamblers" was derived by summing the number of different people a student knew who had gambled in the last 30 days (0, 1, 2, 3, 4 +).

2.3.3. Types of gambling activities

Students indicated, for each of 13 nominated gambling activities, whether they had gambled on that activity in the last month. Types of gambling activities were categorised based on the perceived level of risk (hard versus soft gambling activities). Hard gambling activities have been defined as those with a potential for a high payout ratio and/or rapid event frequency, (Griffiths, 1999) and included gambling on

casino, card or sports games, poker machines, horse or dog racing, personal skill games and two up¹. Soft gambling activities included tipping competitions, sweeps², bingo, lottery tickets, instant scratch cards, raffles tickets and other types of gambling.

2.3.4. Problem gambling

Students who had ever gambled were screened for problem gambling using the 12 item Diagnostic Statistical Manual IV (Multiple Response format) adapted for Juveniles (DSM-IV-[MR]-J). This tool is frequently used by youth gambling researchers, (Stinchfield, 2011) and has demonstrated reliability and validity (Fisher, 2000; O'Neil et al., 2003; Rossen, 2001). In the current study, response options were revised to a dichotomous scale (yes/no). This is consistent with other Australian studies, (Delfabbro et al., 2005; Delfabbro and Thrupp, 2003) and research suggesting the 'yes/no' response scale is more easily answered than frequency response options for this age range (Purdie et al., 2011). Consistent with Fisher, 1999, respondents were classified as follows: (a) non-problem gamblers (did not endorse any of the diagnostic criteria); (b) at risk gamblers (responded 'yes' to between one and three of the diagnostic criteria); and d) problem gamblers (responded 'yes' to four or more of the diagnostic criteria). Students who had never gambled were included in the non-problem gamblers category.

2.3.5. Exposure to gambling promotion

Exposure to advertising was measured through an adaptation of Hing et al.'s 2014 exposure to sports advertising scale, modified to include non-sports gambling promotions such as promotion on social media. Students were asked to indicate whether they had been aware of a range of advertisements or promotions for gambling in the past 30 days. See Table 1 for the complete list of gambling advertisements and promotions.

2.3.6. Student characteristics

Students self-reported their: postcode; age; gender; main language spoken at home; money to spend on self per week (\$AUD); self-considered school achievement; and attendance at school on previous school day. Student's home postcode was used to classify their residential location according to the Accessibility and Remoteness Index of Australia (ARIA +), as either major city or other (inner regional, outer regional, remote, very remote) (Australian Bureau of Statistics, 2018). Level of socioeconomic disadvantage was also based on student postcode using the Socio-Economic Indexes for Areas (SEIFA) Index of Relative Socio-economic Disadvantage (IRSD) decile classifications (Australian Bureau of Statistics, 2017).

2.4. Analysis

All statistical analyses were programmed using SAS v9.4 (SAS Institute, Cary, North Carolina, USA). An alpha level of 0.05 was specified for all tests and confidence intervals. Student exposure to gambling promotions in the last 30 days is presented descriptively (as raw N and weighted proportions), by age and gender.

Principal Component Analysis (PCA) was performed on the eleven gambling advertisement exposures using prior communality estimates of one. Components were extracted using the principal axis method and then rotated orthogonally. Gambling advertisement exposures were considered to load on a given component if the absolute loading was greater than 0.40 for that component and less than 0.40 for the other components. Examination of the association of exposure to gambling

¹ Two Up is an Australian/New Zealand gambling game in which two coins are tossed in the air and bets are laid as to whether both will fall heads or tails uppermost.

² Sweeps involve participants paying to randomly receive the name of a competitor (e.g. horse, team etc.), and winning money if their competitor wins.

promotions with student gambling in the last 30 days, type of gambling activity (hard versus soft), and problem or at risk gambling, was undertaken using logistic mixed-models. Gambling advertisement exposure was included in univariate and multivariable logistic mixed-models using component outcomes of the PCA. The multivariable regression analyses included fixed effects for gender, age, money to spend on self, number of known gamblers, socioeconomic disadvantage, perceived school achievement, attended school yesterday, and a random effect for school ID. Available money per week was categorised as "None", "\$1-\$40", "\$41-\$80" and "\$81+" for analysis. Socio-economic disadvantage was categorised as high (SEIFA IRSD deciles 1–6) or low (SEIFA IRSD deciles 7–10). "Age", "available money per week", "number of known gamblers", "perceived school achievement" were found to be non-linear and were assessed categorically and presented with an overall Wald type-3p-value.

3. Results

A total of 93 schools participated in the ASSAD survey in 2017 (57 schools from Victoria and 36 schools from Queensland). Details of the school sample have been published elsewhere (Freund, Noble, Hill, White, Evans, et al., 2022). The sample was made up of Government schools (68%), Catholic schools (15%) and Independent schools (17%).

Over 7,000 students took part in the survey. Students who were missing responses to core gambling module questions (n = 707) and those who did not answer the first gambling question (have you ever gambled?; n = 112) were removed from the dataset, resulting in a final sample size of 6377 students for analysis. Students who responded 'yes' to the first gambling question (have you ever gambled?) but were missing a response to the gambling in the last month question were assumed not to have gambled in the last month (n = 272).

The demographics of participants have also been reported in detail elsewhere (Freund, Noble, Hill, White, Evans, et al., 2022). Over half of the sample were female (56%), and the largest age group was those aged 16 years (23%). The majority of the sample were from major cities (65%) and inner regional areas (22%). Just over half of the students (54%) were classified as being disadvantaged, based on SEIFA IRSD deciles (deciles 1–6). Half of the students reported having between \$1-\$40 available to spend on themselves per week.

3.1. Gambling behaviours and types of gambling activities

The prevalence of gambling in the last month and at risk and problem gambling, and the types of gambling activities for this student sample has been described previously (Freund, Noble, Hill, White, Evans, et al., 2022). Briefly, 6% of students reported gambling in the previous month and 10% of these were classified as at risk or problem gamblers (Freund, Noble, Hill, White, Leigh, et al., 2022). The most common type of gambling in the last month was betting on horse or dog races. Approximately 4% of all students reported gambling on any hard modality (e.g. card games, casino games, sports betting and poker machines), or any soft modality (e.g. lottery tickets, raffles, sweeps etc.) activity in the last month (Freund, Noble, Hill, White, Leigh, et al., 2022).

3.2. Exposure to gambling promotions

Results of exposure to gambling promotions in the last 30 days by age and gender are shown in Table 1. Across the whole sample, 81% (n = 5165) of students reported being exposed to any form of gambling promotion or advertisement in the last 30 days (data not shown). Of these 5165 students who reported being exposed to any type of advertisements, advertising exposure was most commonly via TV (85%), followed by social media (46%) and then at sporting events (40%).

3.2.1. PCA of exposure to gambling promotions

Results of the PCA are shown in Appendix 1. PCA identified three

Table 1

Exposure to gambling promotion types in the last 30 days among students who reported exposure to any type of advertisements (n = 5165), by age and gender.

Gambling promotion type	Gender n (%)*		Age n (%)*						All n (%)*
	Males	Females	12	13	14	15	16	17	
	n = 2777	n = 3600	n = 485	n = 1193	n = 1027	n = 1083	n = 1475	n = 1114	
Ads on TV	1890 (86%)	2473 (84%)	296 (84%)	769 (85%)	692 (87%)	766 (85%)	1059 (87%)	781 (80%)	4363 (85%)
Ads on social media	1127 (49%)	1317 (44%)	147 (41%)	410 (46%)	356 (44%)	454 (49%)	612 (47%)	465 (51%)	2444 (46%)
Ads on scoreboards/ signage at sporting events	942 (44%)	1064 (36%)	125 (36%)	353 (39%)	308 (39%)	367 (43%)	485 (43%)	368 (38%)	2006 (40%)
Ads on radio	856 (38%)	1205 (40%)	125 (32%)	377 (42%)	306 (38%)	364 (41%)	511 (43%)	378 (38%)	2061 (39%)
Ads on websites	926 (42%)	1050 (35%)	111 (32%)	325 (35%)	281 (37%)	366 (41%)	513 (44%)	380 (39%)	1976 (38%)
Pop-ups on websites	819 (38%)	1153 (39%)	122 (35%)	320 (37%)	290 (36%)	367 (40%)	494 (42%)	379 (38%)	1972 (38%)
Ads at Shops or Newsagencies	846 (41%)	1045 (36%)	129 (37%)	338 (39%)	320 (42%)	329 (36%)	462 (40%)	313 (35%)	1891 (38%)
Ads on billboards	792 (35%)	924 (32%)	108 (30%)	324 (35%)	281 (35%)	317 (36%)	399 (34%)	287 (30%)	1716 (33%)
Ads in pubs or clubs	695 (32%)	902 (30%)	85 (26%)	268 (29%)	249 (31%)	292 (32%)	405 (35%)	298 (31%)	1597 (31%)
Live studio crosses	597 (28%)	622 (22%)	76 (24%)	211 (24%)	206 (25%)	226 (26%)	279 (25%)	221 (24%)	1219 (25%)
Celebrities promoting gambling	543 (23%)	499 (17%)	53 (14%)	163 (16%)	160 (19%)	212 (24%)	251 (21%)	203 (21%)	1042 (20%)

*Weighted proportions.

components which accounted for 55% of the total variance. Five gambling promotions loaded onto the first component: ads at shops or newsagencies, pubs or clubs, on websites, on social media, and pop-ups on websites. The latter two promotions (websites and social media) loaded more heavily on component 1 than the others. Three advertising exposures: ads at sporting events, live studio crosses, and celebrities promoting gambling; loaded on the second component, and three (ads on TV, radio and billboards) on the third component. Due to a specific interest in exposure to online advertisements, the first component was split into two. Based on the relative component loadings, gambling promotion exposures were grouped into the following four binary exposures (exposed/not exposed): Online ads (including websites, pop-ups on websites, social media); Retail, pubs & clubs ads (shops, newsagencies, pubs/clubs); Sports/celebrity ads (sporting events, live studio crosses, celebrity promotions); and Traditional media ads (TV, radio, billboards).

3.3. Association of exposure to gambling promotions with student gambling behaviours

Univariate associations between exposure to gambling promotions and student gambling behaviours are shown in Table 2. Results of the adjusted logistic regressions are presented in Table 3. All students with data available were included in the regression analyses (including those who had never gambled or had not gambled in the last month).

3.3.1. Gambled in the last month

In the unadjusted model (Table 2), exposure to Online ads, Retail, pubs & clubs ads, and Sports/celebrity ads were all significantly associated with students gambling in the last month. However, after adjusting for the other characteristics (gender, age, money to spend on self, number of known gamblers, socioeconomic disadvantage, perceived school achievement, attended school yesterday, and school ID), only Online gambling exposure remained significant. Students were more likely to have gambled in the last month if they reported being aware of Online ads in the last month (OR 1.37; 95% CI: 1.01, 1.85); Table 3). As has been previously reported, gender and the number of known gamblers remained significant in the adjusted regression model (Freund, Noble, Hill, White, Leigh, et al., 2022).

3.3.2. Participated in any hard gambling activity in the last 30 days

In the unadjusted model (Table 2), exposure to Online ads, Retail, pubs & clubs ads, and Sports/celebrity ads were all significantly associated with students participation in a hard gambling activity in the last month. After adjusting for the other characteristics (gender, age, money to spend on self, number of known gamblers, socioeconomic disadvantage, perceived school achievement, attended school yesterday, and school ID), there were no significant associations between exposure to gambling promotions in the last month and student engagement in hard gambling activities in the last month (Table 3). As previously reported, gender and the number of known gamblers remained significant in the regression model (Freund, Noble, Hill, White, Leigh, et al., 2022).

3.3.3. At risk or problem gambler

In the unadjusted model (Table 2), exposure to Online ads, Retail, pubs & clubs ads, and Sports/celebrity ads were all significantly associated with students at risk or problem gambling classification. After adjusting for the other characteristics (gender, age, money to spend on self, number of known gamblers, socioeconomic disadvantage, perceived school achievement, attended school yesterday, and school ID), only Online gambling remained significant. Students were more likely to be classified as at risk or problem gamblers if they reported being aware of online gambling ads in the last month (OR 1.84; 95% CI: 1.41, 2.38; Table 3). As previously reported, gender, money to spend on self, and the number of known gamblers remained significant in the regression model (Freund, Noble, Hill, White, Evans, et al., 2022).

4. Discussion

In this large two-state sample of Australian secondary school students, exposure to gambling promotions was common, with the majority of students being aware of any type of gambling advertising in the last month (81%). Of those students, 85% reported being aware of advertisements for gambling on TV in the last month, 46% of advertisements for gambling on social media, and 40% of ads at sporting events. These results are in line with previous reviews which indicate the majority of adolescents and young people are exposed to gambling advertising on TV, the internet and at sports events (Labrador et al., 2021).

With the exception of Traditional media advertising (TV, radio and

Table 2

Univariate association between exposure to gambling promotion and gambled last 30 days, engagement in hard gambling activities in the last 30 days, and at risk/problem gambling (unadjusted crude results).

Characteristic	Gambled last 30 days				Hard gambling activities				At risk/problem gambler			
	OR	Lower 95% CI	Upper 95% CI	p value	OR	Lower 95% CI	Upper 95% CI	p value	OR	Lower 95% CI	Upper 95% CI	p value
Online Ads												
Exposed	1.72	1.34	2.22	<0.001	1.87	1.38	2.55	<0.001	2.08	1.67	2.59	<0.001
Not exposed (reference)												
Retail, pubs & clubs Ads												
Exposed	1.64	1.31	2.05	<0.001	1.87	1.42	2.46	<0.001	1.64	1.35	1.98	<0.001
Not exposed (reference)												
Sports/celebrities Ads												
Exposed	1.67	1.33	2.10	<0.001	1.80	1.37	2.37	<0.001	1.59	1.32	1.93	<0.001
Not exposed (reference)												
Traditional media Ads												
Exposed	1.18	0.84	1.65	0.343	1.17	0.77	1.77	0.457	1.25	0.94	1.67	0.117
Not exposed (reference)												
Gender												
Male (reference)												
Female	0.48	0.38	0.61	<0.001	0.50	0.38	0.66	<0.001	0.31	0.26	0.38	<0.001
Age												
12yrs	0.24	0.11	0.49		0.11	0.04	0.33		0.38	0.22	0.64	
13yrs	0.52	0.33	0.83		0.40	0.23	0.71		0.58	0.41	0.83	
14yrs	0.81	0.52	1.26		0.60	0.35	1.04		0.93	0.66	1.29	
15yrs	0.95	0.63	1.42		0.71	0.43	1.17		1.07	0.79	1.46	
16yrs	0.95	0.67	1.33		0.86	0.57	1.28		0.95	0.73	1.25	
17yrs (reference)				<0.001*				<0.001*				<0.001*
Money available per week												
None (reference)				<0.001*				<0.001*				<0.001*
\$1-\$40	1.27	0.89	1.83		1.41	0.89	2.25		1.45	1.06	2.00	
\$41-\$80	1.41	0.91	2.20		1.89	1.10	3.25		1.98	1.36	2.87	
\$81+	2.46	1.68	3.61		2.89	1.78	4.69		2.62	1.88	3.65	
SEIFA												
Decile 1–6	1.17	0.90	1.53	0.236	1.27	0.92	1.75	0.152	1.23	1.00	1.51	0.049
Decile 7–10 (reference)												
Self assessed school achievement												
A lot/above average	1.18	0.95	1.47		1.27	0.97	1.65		1.22	1.01	1.47	
Average (reference)				0.314*				0.195*				0.025*
A lot/below average	1.14	0.78	1.65		1.24	0.79	1.93		1.41	1.05	1.90	
Attended school yesterday												
Yes (reference)												
No	1.38	1.06	1.79	0.017	1.19	0.86	1.66	0.294	1.35	1.09	1.69	0.007
Number of Known Gamblers												
0 (reference)				<0.001*				<0.001*				<0.001*
1	5.63	4.14	7.65		5.87	3.96	8.69		3.12	2.50	3.91	
2	9.43	6.57	13.53		12.79	8.27	19.78		6.21	4.73	8.16	
3	15.31	10.20	22.98		16.72	10.22	27.36		6.70	4.73	9.48	
4+	45.71	29.31	71.29		55.27	33.34	91.62		13.25	8.82	19.90	

*Wald type-3p-value. The number of students included in the unadjusted analyses ranged from n = 4993 to 6377.

billboards), exposure to other types of gambling advertising (Online; Retail, pubs & clubs; and Sports/celebrity ads) were associated with each of the gambling outcomes in the unadjusted analyses. However, after adjusting for sociodemographic variables and the range of gambling exposures, only exposure to online gambling ads (websites, pop-ups on websites, and social media) in the last month was significantly associated with adolescent gambling in the last month, and being classified as an at risk or problem gambler. Students who reported being aware of online gambling ads were 37% more likely to have gambled in the last month, and 84% more likely to be classified as an at risk or problem gambler, than those who did not report exposure to online gambling ads. Online gambling exposure was not associated with engaging in a hard gambling activity in the last month. Results suggest that while exposure to most forms of gambling are associated with adolescent gambling behaviours, the role of online advertising is

particularly important. Interestingly, exposure to ads on traditional media did not appear to be linked to gambling behaviours, perhaps suggesting a decline in the influence of such avenues of advertising for younger Australians.

Only limited previous research has examined whether gambling advertising exposure is associated with youth gambling behaviours, (Clemens et al., 2017) with five studies having been conducted across Germany, (Clemens et al., 2017; Hayer et al., 2018) Canada, (Der-evensky et al., 2010) Spain, (Parrado-González and León-Jariego, 2020) and Israel (Gavriel Fried et al., 2010). Similar to findings for adults, (Bouguettaya et al., 2020) exposure to gambling promotions was significantly associated with youth gambling behaviours including gambling frequency in the last year, (Clemens et al., 2017; Hayer et al., 2018; Parrado-González and León-Jariego, 2020) month, (Clemens et al., 2017) or week, (Clemens et al., 2017; Gavriel Fried et al., 2010)

Table 3

Multivariate association between exposure to gambling promotion and gambled last 30 days, engagement in hard gambling activities in the last 30 days, and at risk/problem gambling (adjusted results).¹

Characteristic	Gambled last 30 days (n = 4924)				Hard gambling activities (n = 4924)				At risk/problem gambler (n = 4770)			
	OR	Lower 95% CI	Upper 95% CI	p value	OR	Lower 95% CI	Upper 95% CI	p value	OR	Lower 95% CI	Upper 95% CI	p value
Online Ads												
Exposed	1.37	1.01	1.85	0.045	1.41	0.98	2.03	0.065	1.84	1.41	2.38	<0.001
Not exposed (reference)												
Retail, pubs & clubs Ads												
Exposed	1.06	0.79	1.42	0.691	1.19	0.84	1.68	0.334	1.08	0.85	1.38	0.530
Not exposed (reference)												
Sports/celebrities Ads												
Exposed	1.13	0.85	1.52	0.395	1.05	0.74	1.49	0.782	1.04	0.81	1.32	0.773
Not exposed (reference)												
Traditional media Ads												
Exposed	0.87	0.58	1.30	0.492	0.79	0.49	1.28	0.341	1.07	0.77	1.49	0.692
Not exposed (reference)												
Gender												
Male (reference)												
Female	0.44	0.33	0.57	<0.001	0.49	0.35	0.67	<0.001	0.29	0.23	0.36	<0.001
Age												
12yrs	0.44	0.19	1.01		0.26	0.08	0.85		0.53	0.28	1.03	
13yrs	0.71	0.41	1.23		0.59	0.30	1.18		0.83	0.55	1.26	
14yrs	0.95	0.57	1.59		0.88	0.47	1.65		1.18	0.81	1.73	
15yrs	0.89	0.55	1.41		0.78	0.44	1.39		1.11	0.78	1.58	
16yrs	0.96	0.65	1.41		0.87	0.55	1.39		0.95	0.70	1.30	
17yrs (reference)				0.404*				0.250*				0.143*
Money available per week (\$AUD)												
None (reference)				0.180*				0.152*				0.006*
\$1-\$40	1.23	0.80	1.91		1.36	0.79	2.36		1.40	0.97	2.02	
\$41-\$80	1.33	0.79	2.25		1.69	0.90	3.19		1.77	1.15	2.73	
\$81+	1.61	1.01	2.57		1.84	1.03	3.30		1.90	1.28	2.81	
SEIFA												
Decile 1–6	1.08	0.80	1.47	0.619	1.25	0.86	1.82	0.242	1.15	0.91	1.44	0.237
Decile 7–10 (reference)												
Self assessed school achievement												
A lot/above average	1.11	0.85	1.44		1.18	0.87	1.61		1.09	0.88	1.35	
Average (reference)				0.301*				0.485*				0.282*
A lot/below average	0.75	0.46	1.23		0.91	0.52	1.61		1.33	0.93	1.91	
Attended school yesterday												
Yes (reference)												
No	1.20	0.87	1.65	0.264	1.00	0.68	1.49	0.988	1.16	0.89	1.51	0.264
Number of Known Gamblers												
0 (reference)				<0.001*				<0.001*				<0.001*
1	5.39	3.85	7.55		5.47	3.56	8.41		2.93	2.28	3.76	
2	8.66	5.83	12.86		11.62	7.20	18.75		5.74	4.23	7.78	
3	14.58	9.33	22.79		14.95	8.69	25.72		6.20	4.21	9.12	
4+	46.76	28.16	77.66		54.32	30.44	96.94		11.10	6.98	17.65	

*Wald type-3p-value.

¹ Multivariate analyses were adjusted for gender, age, money to spend on self, number of known gamblers, socioeconomic disadvantage, perceived school achievement, attended school yesterday, and school ID.

and with being classified as a problem gambler (Derevensky et al., 2010; Gavriel Fried et al., 2010). However, all five studies used an overall measure of exposure to gambling advertising (i.e. assessed exposure across a range of mediums, including the internet), rather than investigating different types of gambling advertising exposure. The current study provides the first evidence of a specific association between online gambling advertising exposure and youth gambling behaviours.

Current findings highlight the need to further explore the impacts of online gambling advertising on young people’s gambling behaviours, particularly in the Australian context. The link between online advertising and youth gambling is concerning given the rapid expansion of gambling advertising into the digital sphere via online and social media marketing, (Torrance et al., 2021) and that young people tend to have

the highest use of the internet and social media (Gainsbury et al., 2016; Kristiansen & Severin-Nielsen, 2021). Young people can access gambling via betting or related apps, (King et al., 2020) where online advertising may be targeted towards the types of gambling activities that the young person engages in. In contrast to traditional media, social media outlets remain largely unregulated (Gainsbury et al., 2016; O’Loughlin & Blaszczynski, 2018). A 2016 review found that most gambling operators did not incorporate responsible gambling messaging in their use of social media, despite this being a requirement of most advertising codes of conduct (Gainsbury et al., 2016). In addition, advertising via social media may be particularly appealing to young people, because postings might not be recognised as advertising, and content can be shared and promoted by peers, including to underage

users (Kristiansen & Severin-Nielsen, 2021; O'Loughlin & Blaszczynski, 2018). Restrictions on gambling advertising have been identified as a potentially cost-effective measure for reducing harms associated with gambling (Bouguettaya et al., 2020; Parrado-González and León-Jariego, 2020). The current study highlights the need to continue to regulate all forms of gambling advertising, as well as expand and enforce such restrictions on online gambling advertising (Kristiansen & Severin-Nielsen, 2021).

4.1. Limitations

All variables collected in the questionnaire were self-reported, and are subject to potential recall error and social desirability biases. In particular, we asked students to indicate whether they had been aware of a range of advertisements or promotions for gambling in the last month. As such, we measured recall of gambling promotions as a proxy measure of exposure. It is possible that participation in gambling affects recall of exposure to advertisements, rather than the other way around (Gavriel Fried et al., 2010; Newall et al., 2019). In addition, we did not assess the frequency or level of exposure to types of gambling promotions, with students classified only as either exposed or not exposed to each advertising category. There may have been some overlap between the exposure categories - for example, celebrity promotions may have been seen on the internet or TV. It is possible that the lack of an association between exposure to non-online forms of gambling promotions (e.g. TV, radio, during sports events, celebrities promoting gambling etc.) and gambling behaviour was as a result of not assessing the degree of exposure to such promotions among students; and/or due to some overlap between exposure categories.

5. Conclusion

This large quantitative and representative study is the first to explore the relative role of exposure to gambling advertising via different platforms on adolescent gambling behaviours. We found evidence of an association between youth exposure to gambling advertising and engagement in gambling activities and at risk or problem gambling, especially for exposure to online gambling promotions. Our study suggests the important potential role of social media advertising in influencing the gambling behaviours of Australian youth. More Australian and international research should be conducted to confirm and further the findings, particularly studies using longitudinal designs. Current results point to the need to implement controls on gambling advertising and particularly online gambling promotions, in order to "problematise what advertising normalises" (Parrado-González and León-Jariego, 2020).

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Contributors

MF, DH, VW, MS, RSF designed the study and wrote the protocol. NN

and MF conducted literature searches and provided summaries of previous research studies. VW, LL and DL conducted the statistical analysis. NN and MF wrote the first draft of the manuscript. All authors contributed to and have approved the final manuscript.

CRediT authorship contribution statement

Natasha Noble: Data curation, Investigation, Writing - original draft, Writing - review & editing. **Megan Freund:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Writing - original draft, Writing - review & editing. **David Hill:** Conceptualization, Formal analysis, Investigation, Methodology, Project administration, Writing - review & editing. **Victoria White:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing - review & editing. **Lucy Leigh:** Data curation, Formal analysis, Writing - review & editing. **David Lambkin:** Data curation, Formal analysis, Writing - review & editing. **Maree Scully:** Conceptualization, Investigation, Methodology, Project administration, Resources, Writing - review & editing. **Robert Sanson-Fisher:** Conceptualization, Funding acquisition, Investigation, Methodology, Writing - review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.abrep.2022.100439>.

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