

Gambling Risk Groups are Not All the Same: Risk Factors Amongst Sports Bettors

Alex M. T. Russell¹  · Nerilee Hing²  · En Li³  · Peter Vitartas⁴ 

Published online: 20 March 2018

© Springer Science+Business Media, LLC, part of Springer Nature 2018

Abstract Sports betting is increasing worldwide, with an associated increase in sports betting-related problems. Previous studies have examined risk factors for problem gambling amongst sports bettors and have identified demographic, behavioural, marketing, normative and impulsiveness factors. These studies have generally compared those in problem gambling, or a combination of moderate risk and problem gambling, groups to non-problem gamblers, often due to statistical power issues. However, recent evidence suggests that, at a population level, the bulk of gambling-related harm stems from low risk and moderate risk gamblers, rather than problem gamblers. Thus it is essential to understand the risk factors for each level of gambling-related problems (low risk, moderate risk, problem) separately. The present study used a large sample ($N = 1813$) to compare each gambling risk group to non-problem gamblers, first using bivariate and then multivariate statistical techniques. A range of demographic, behavioural, marketing, normative and impulsiveness variables were included as possible risk factors. The results indicated that some variables,

✉ Alex M. T. Russell
a.m.russell@cqu.edu.au

Nerilee Hing
n.hing@cqu.edu.au

En Li
e.li@cqu.edu.au

Peter Vitartas
p.vitartas@latrobe.edu.au

¹ Experimental Gambling Research Laboratory, School of Health, Medical and Applied Sciences, CQUniversity, 400 Kent St, Sydney, NSW 2000, Australia

² Experimental Gambling Research Laboratory, School of Health, Medical and Applied Sciences, CQUniversity, Bundaberg, QLD, Australia

³ Experimental Gambling Research Laboratory, School of Business and Law, CQUniversity, Rockhampton, QLD, Australia

⁴ Department of Entrepreneurship, Innovation and Marketing, La Trobe Business School, La Trobe University, Bundoora, VIC, Australia

such as gambling expenditure, number of accounts with different operators, number of different types of promotions used and impulsiveness were significantly higher for all risk groups, while others such as some normative factors, age, gender and particular sports betting variables only applied to those with the highest level of gambling-related problems. The results generally supported findings from previous literature for problem gamblers, and extended these findings to low risk and moderate risk groups. In the future, where statistical power allows, risk factors should be assessed separately for all levels of gambling problems.

Keywords Sports betting · Gambling · Risk factors · Problem gambling · Impulse betting

Introduction

Sports betting activities are increasing worldwide, especially in countries such as Australia, Singapore and the UK where their regulation has been liberalised (Foley-Train 2014). Several researchers have argued that sports betting is increasingly contributing to problem gambling (Hing et al. 2014a, c; Lamont et al. 2011; McMullan 2011), and early evidence supports this contention. In a worldwide review of gambling prevalence studies conducted since 1975, sports betting was one of the forms most strongly associated with problem gambling (Williams et al. 2012a). Analyses of wagering data also implicate sports betting in problem gambling (Brosowski et al. 2012; LaPlante et al. 2014), and gambling treatment services have reported a greater proportion of clients presenting with sports betting problems (Błaszczynski and Hunt 2011). Thus, it is important to identify risk factors for problem gambling amongst sports bettors. From a public health perspective, it is also informative to identify risk factors for low risk and moderate risk gambling. This is because, at the population level, most of the harm arising from gambling is actually due to low risk and moderate risk gambling (Browne et al. 2016). Therefore, understanding the determinants of harmful gambling at all levels of gambling risk can more comprehensively inform prevention, harm minimisation and treatment initiatives in order to reduce overall gambling harm.

Demographic, behavioural, normative and marketing risk factors amongst sports bettors have previously been studied, amongst 639 sports bettors from Queensland Australia, with more frequent sports bettors purposefully oversampled (Hing et al. 2016). However, Hing et al. (2016) examined only factors increasing problem gambling severity scores amongst sports bettors, and did not distinguish amongst risk factors for low risk, moderate risk and problem gamblers. Their study was also limited to bivariate analyses, due to the use of non-parametric statistics, and therefore could not identify unique contributors to gambling problems. Other studies have focused on a narrower range of risk factors amongst sports bettors, such as betting behaviours (Adami et al. 2013; Braverman and Shaffer 2012; LaBrie and Shaffer 2011; Xuan and Shaffer 2009), peer group influence (Gordon et al. 2015) and marketing factors (Sproston et al. 2015), or have focussed on demographic, behavioural and psychological risk factors amongst *online* sports bettors (Hing et al. 2017a). A more comprehensive risk factor model has yet to be tested. Thus, the aim of the present investigation was to examine demographic, behavioural, marketing, normative and impulsiveness risk factors related to sports betting for all levels of gambling-related problems, using a large dataset that allowed sufficient statistical power using multivariate techniques.

Literature Review

Demographic Risk Factors for Gambling-Related Problems

A literature review notes that research has consistently found younger age and male gender to be risk factors for problematic gambling in general, as well as ethnicity/immigration status and lower education (Johansson et al. 2009). Income and marital status were not clear risk factors, because existing studies have produced contradictory results.

However, different gambling forms appeal to different demographics. For example, lottery gamblers tend to be older and in paid employment, whereas sports bettors tend to be young males aged 18–34 (Delfabbro 2012; Humphreys and Pérez 2012; Sproston et al. 2012; Wardle and Seabury 2012). Concerns have been raised about the vulnerability of young males to sports betting problems (Lamont et al. 2011; McMullan 2011; Thomas et al. 2012b), and young men are increasingly reporting difficulty controlling their online sports betting to treatment providers (Blaszczynski and Hunt 2011). Thus young age and male gender are likely to be risk factors amongst sports bettors.

Other demographic characteristics, including income, education and marital status, also differ across gambling forms (Delfabbro 2012), and have been related to gambling problems (Delfabbro 2012; Williams et al. 2012a, b). Delfabbro (2012) notes that these factors are likely to be confounded with age. It is surprising, then, that sports bettors tend to be younger, and yet have higher income than those who engage in other forms (Delfabbro 2012, p. 21). Hing et al. (2016) found no significant relationship between income and problem gambling amongst sports bettors, while another study of online sports bettors found an association with lower income (Hing et al. 2017b). Given these contradictory results, studying income as well as disposable income amongst sports bettors may provide new insights in the current study.

Hing et al. (2016) found that marital status (being single/never married) and education (particularly those with undergraduate degrees) were related to higher problem gambling severity amongst sports bettors. However, as Hing et al. used non-parametric statistical analyses, they were unable to conduct multivariate analyses to control for confounds between variables (Delfabbro 2012). Thus, there is scope for a multivariate analysis of these factors amongst sports bettors that can account for overlap between potentially-related variables.

Finally, ethnic minority status (measured by being born outside of Australia and speaking a language other than English as the main language at home) has been related to gambling problems amongst Australian online sports bettors (Hing et al. 2017b). Hence, ethnicity is another candidate factor being examined in the current study.

Sports Betting Behaviours

Several behavioural aspects of sports betting have been related to problem gambling. One is sports betting involvement, reflected in sports betting frequency, expenditure and number of sports betting accounts. Higher sports betting frequency and expenditure have been associated with gambling problems amongst sports bettors (Braverman and Shaffer 2012; Hing et al. 2017a; LaBrie and Shaffer 2011), and gambling online also appears to be associated with gambling-related problems (Gainsbury et al. 2013; Wardle et al. 2011; Wood and Williams 2010). Gainsbury et al. (2015) found that online gamblers who held

accounts with multiple betting providers were significantly more likely to be problem gamblers, although Hing et al. (2016) found no such relationship amongst sports bettors. Taken together, these results suggest that greater involvement in sports betting may be a risk factor for gambling-related problems.

A further behavioural risk factor may be the types of sports bets placed. Greater preference for betting on within-match contingencies appears to distinguish higher risk from lower risk sports bettors. For example, Hing et al. (2016) found that sports bettors with higher problem gambling severity scores placed a greater percentage of their bets on key events and micro events within the match (rather than on the final outcome of the match). Analyses based on wagering industry data (Brosowski et al. 2012; LaPlante et al. 2014) have also identified in-play betting as a risk factor for problem gambling, especially on live action bets (micro bets). In Australia, these micro in-play bets cannot be placed via domestically-regulated betting websites, only via telephone and in retail outlets; although they are provided illegally by offshore sites that are readily available to Australian sports bettors. Hing et al. (2016) found that placing a higher proportion of bets via the telephone is a risk factor for problem gambling amongst sports bettors, which likely reflects a preference for placing in-play bets through legal channels. Thus, the mode of placing bets is important to consider when assessing risk factors for sports bettors who are subject to different regulatory restrictions on different bet types.

Exposure to Advertising and Use of Promotions

Advertisements for gambling products are deeply integrated in broadcasts of sporting events (GBGC 2013; Milner et al. 2013; Thomas et al. 2012a), and exposure to gambling-related marketing is increasing (ACMA 2013; Gainsbury et al. 2016a; Hing et al. 2014a; McMullan 2011; Sproston et al. 2015). These advertisements tend to promote gambling on sports as a healthy, harmless activity (Lamont et al. 2011).

This level of exposure may normalise sports betting (Lamont et al. 2011; Sproston et al. 2015; Thomas et al. 2012b). Sproston et al. (2015) noted that regular discussions about gambling and the placement of bets occur in workplaces and social settings. Gordon et al. (2015) found that sports betting was embedded in the everyday lives of 18–30 year old sports bettors in Australia. Thomas et al. (2012a, b) suggest that young adult males may succumb to peer pressure from friends in order to fit in. Thus it is important to understand how sports bettors perceive the level of gambling involvement of their peers, including others of similar age and gender.

Furthermore, previous research has found that at-risk and problem gamblers report higher levels of exposure to sports betting advertisements and promotions (Hing et al. 2015; Sproston et al. 2015), although the relationship between exposure to gambling marketing and problem gambling is complex and has not been established (Lopez-Gonzalez et al. 2017). Indeed, marketing theory suggests that more involved consumers pay more attention (Pratkanis and Greenwald 1993), and that repeated exposure has positive effects leading to formation of preferences (Fang et al. 2007). These marketing cues can induce craving, and urge-inducing triggers can reinforce gambling behaviour over time (Binde 2009, 2014; Hing et al. 2014c; Martin et al. 2013), thus thwarting attempts to moderate or abstain from gambling.

At least some of these promotions are designed to encourage impulse betting, and problem gamblers tend to be more impulsive (see van Holst et al. 2010 for a review), especially

amongst younger people, including adolescents (Vitaro et al. 1997). As such, impulse betting may be an important risk factor for problem gambling.

Impulse Betting

The consumer behaviour literature describes impulse buying as spontaneous purchasing, without due reflection by the purchaser of why that purchase should be made (Rook 1987; Rook and Fisher 1995; Sharma et al. 2010; Verplanken and Herabadi 2001).

Impulse purchases are most likely to occur amongst individuals with higher levels of impulsivity, due to situational factors that create a strong urge to purchase the product, and the desire for immediate gratification, with reduced concern about the consequences (Amos et al. 2014; Rook 1987; Youn and Faber 2000). As noted above, problem gamblers tend to be more impulsive, raising concerns about advertisements and promotions that encourage impulse betting, and the ability to place the bet immediately online, including on connected devices (Gainsbury et al. 2016b). Furthermore, Amos et al. (2014) found that the strongest situational determinant of impulse buying was positive social influence, such as perceived social norms. When taken together with the studies described above that indicate that young males in particular may be vulnerable to social influence around sports betting (Gordon et al. 2015; Thomas et al. 2012b), there are concerns around impulse betting as a risk factor for problem gambling.

A key example of impulse betting is live-action, or in-play betting, which involves bets placed on events such as the outcome of the next ball in a cricket match. Studies by LaBrie et al. (2007) and LaPlante et al. (2008) have identified a group of highly involved sports bettors that is heavily involved in in-play betting. In-play bets are almost always placed on impulse, because the markets are only available for a short period of time, and are generally not available before the match starts. In-play bets are attractive to problem gamblers (Hing et al. 2014c) and the advertisements for these types of bets generally emphasise the ease of placing impulse bets (Hing et al. 2015; Sproston et al. 2015). Placing a higher proportion of impulse bets has previously been implicated as a factor that distinguishes high risk sports bettors (Braverman et al. 2013; Gray et al. 2012; Hing et al. 2016; LaPlante et al. 2008, 2014; Nelson et al. 2008), including bets placed during the match, as well as bets placed on impulse before the start of the match (Hing et al. 2016).

A New Perspective

Many studies into issues related to problem gambling do not focus exclusively on problem gamblers, since they comprise a relatively small percentage of the population. Instead, such studies tend to combine moderate risk [Problem Gambling Severity Index (PGSI) score 3–7; Ferris and Wynne 2001] and problem gamblers (PGSI score 8–27) in order to provide enough statistical power to find statistically significant results. Similarly, most risk factor studies compare “non-problem” gamblers to “at-risk” gamblers, with the former group based on a PGSI score of 0–2 (i.e., non-problem and low risk gamblers), and the latter group on 3–27 (i.e., moderate risk and problem gamblers).

However, an influential recent study (Browne et al. 2016) indicates that, at a population level, approximately half of gambling-related harm is due to low risk gamblers, one-third is due to moderate risk gamblers, with only 15% due to problem gamblers. Thus, it is important to consider these groups separately where statistical considerations allow, to inform appropriate interventions that can be targeted towards each group. The present study sought

to examine demographic, behavioural, marketing, normative and impulsiveness risk factors related to sports betting for all levels of gambling-related problems separately for low risk, moderate risk and problem gamblers, by comparing each group to non-problem gamblers. The large sample obtained for this study allowed us to overcome statistical power issues for such an analysis.

Methods

Participants and Recruitment

A total of 1813 respondents were recruited through an online panel provider (Qualtrics). Inclusion criteria were: being 18 years or older, living in Australia, and betting on sports during the last 12 months. The survey was administered during July to September, 2016 and median survey completion time was 17.0 min. Informed consent was obtained at the start of the survey and respondents were told that they could withdraw at any time. The respondents were mostly male (68.9%), with a mean age of 35.3 years ($SD = 12.6$).

This study was approved by Southern Cross University Human Research Ethics Committee, approval number ECN-16-201, and reciprocal approval was granted by CQUniversity Human Research Ethics Committee, approval number H16/06-163.

Measures

Problem Gambling

The Problem Gambling Severity Index (PGSI; Ferris and Wynne 2001) was used as a measure of problem gambling. The PGSI consists of nine items, with response options ranging from never (0) to almost always (3). Possible scores range from 0 to 27, and respondents are classified into the following risk groups based on their score: non-problem gamblers (NP; PGSI = 0), low risk gamblers (LR; PGSI = 1–2), moderate risk gamblers (MR; PGSI = 3–7) and problem gamblers (PG; PGSI = 8–27). Cronbach's alpha for the PGSI in this dataset was .94.

Demographics

The following demographic measures were collected: gender (male, female); age (years); personal pre-tax annual income for the last year (in \$10K brackets); personal disposable weekly income; marital status (see Table 1 for response options); highest level of education (see Table 1 for response options); and main language spoken at home (English, other).

Sports Betting Behaviour

The following variables were collected in terms of sports betting behaviour: frequency of sports betting overall during the last 12 months (never, less than once every 2 months, about once every 2 months, about once a month, 2–3 times a month, about once a week, 2–3 times a week, 4 times or more a week), as well as frequency of betting on each of nine sports during the last 12 months; the year in which they first bet on sports (recoded into number of years since they first bet on sports); number of accounts with different operators;

Table 1 Comparisons of demographic characteristics between non-problem, low-risk, moderate-risk and problem gamblers

Variable	PGSI group				Inferential statistics			
	NP	LR	MR	PG	NP versus LR	NP versus MR	NP versus PG	NP versus PG
<i>n</i>	353	294	320	849				
Gender (% male)	63.5	73.5	77.5	66.5	7.39*	15.80*	1.06	
Age (M, SD)	40.42 (14.94)	37.73 (14.23)	36.80 (13.41)	31.69 (9.25)	2.33	3.32**A	10.20**A	
Personal pre-tax annual income (M, SD, \$10K brackets)	7.10 (4.27)	7.31 (4.40)	7.07 (3.93)	8.55 (4.29)	-.60	.09	- 5.19	
Disposable income per week (M, SD)	7.95 (3.46)	7.83 (3.37)	8.32 (3.22)	8.34 (3.64)	.42	- 1.44	- 1.79	
Marital status (%)					1.45	5.33	15.40*	
Single/never married	29.5	33.7	37.8	34.0				
Living with partner/de facto	19.0	18.7	17.2	16.4				
Married	43.1	40.1	37.2	46.1				
Divorced, separated, widowed	8.5	7.5	7.8	3.5				
Education (%)					5.10	7.88	28.34*	
Less than year 12	9.1	7.1	14.7	9.4				
Year 12 or equivalent	22.4	21.8	22.8	25.2				
A trade, technical certificate or diploma	30.3	28.2	28.4	19.7				
A university or college degree	24.9	32.3	25.3	36.7				
Postgraduate qualifications	13.3	10.5	8.8	9.0				
Main language spoken at home (% English)	98.0	98.0	98.4	97.4	.00	.17	.39	

Inferential tests are Bonferroni-corrected tests, alpha = .017. Tests are independent samples *t* tests or Welch *t* tests (indicated by ^) for means or Chi square tests of independence for percentages. **p* < .017. Values in bold are significantly different to that for the non-problem group

NP non-problem, LR low risk, MR moderate risk, PG problem gamblers

expenditure on sports betting not including winnings in a typical month during the last 12 months (open-ended question); number of days in a typical month on which they bet on sports during the last 12 months (open-ended, maximum possible answer = 31); average number of bets per day on which they bet on sports (open-ended, no restriction).

Respondents were also asked about the modes they use for sports betting during the last 12 months by asking the percentage of their sports bets that were placed online, by telephone calls and via land-based venues (with the total required to sum to 100%).

Respondents were also asked about the types of sports bets that they placed during the last 12 months, including: the percentage of bets placed before and after the match started (total required to sum to 100%, here we only report percentage placed after the match started as the results are complementary); the percentage of bets placed on the final outcome of the match, versus key events within the match (e.g., who scores the first goal), versus micro events within the match (e.g., the outcome of the next ball in cricket; with the total for the three options required to sum to 100%).

Exposure to Advertising and Use of Promotions

Measures of possible exposure to advertising and promotions included: frequency of watching sports live, on television or online during the most recent or current season (a composite variable of frequency of watching multiple sports; Cronbach's alpha .86); frequency of seeing or hearing advertisements and promotions for sports betting when exposed to the media (never, sometimes, most of the time, almost always); number of promotions used (based on frequency of use of ten types of sports betting promotions during the last 12 months, such as bonus bet, multi bet offer and refund/stake back offer).

Peer Norms

Peer norms for sports betting was measured by asking respondents to estimate the gambling habits of other people of their age and gender. The three questions were; estimated monthly expenditure (open-ended), estimated number of days per month on which sports bets were placed (open-ended, maximum of 31), and estimated number of bets placed on a typical day on which others of their age and gender bet on sports (open-ended).

Impulsiveness

Impulsiveness was measured using the 8-item Barratt Impulsiveness Scale-Brief (BIS-Brief; Steinberg et al. 2013), with response options ranging from 'rarely/never' (1) to 'almost always/always' (4), and appropriate items reverse-coded. Cronbach's alpha for the BIS-Brief in this sample was .74.

Data Analysis

Bivariate and multivariate analyses were used to compare PGSI groups. We opted to use PGSI groups because they are more informative than raw scores from a policy perspective. The approach taken was to compare, separately, low risk (LR), moderate risk (MR) and problem gamblers (PG) to non-problem (NP) gamblers on each of the variables of interest, using Chi square tests of independence for categorical variables and

Bonferroni-corrected independent samples *t* tests for continuous variables, or Welch *t* tests where assumptions of equal variances were violated (see, e.g., Ruxton 2006).

Following these bivariate analyses, we conducted a multivariate analysis, in the form of an ordinal logistic regression, to account for overlap between the bivariate results. Variable selection, as well as tests for multicollinearity, are described in the results section below, as they are informed by the bivariate results. Thus, both sets of results (bivariate and multivariate) compare NPs to LR, to MR and to PG gamblers.

Some of the variables of interest (expenditure and number of bets placed per day of betting, as well as the participants' estimates of expenditure and number of bets placed per day of betting by their peers) contained extreme outliers (up to 20 SD above the mean). In order to address this, the extreme 5% of outliers were winsorised for these variables (Salkind 2010, p. 1636). Winsorised results are identified in the tables.

Three variables relating to sports betting, advertising exposure and the use of promotions were considered for dimension reduction: frequency of betting on each of nine sports, frequency of watching each of nine sports, and frequency of uptake of each of 10 types of promotions. For betting frequency and frequency of uptake of promotions, factor analyses indicated unidimensional solutions for each, indicating that a single variable would be a more parsimonious method of analysing this information. Thus, general sports betting frequency was used for analysis, and promotions used was converted into a "number of different types of promotions used" variable, which correlated with each of the frequency of promotions variables ($r \sim .7$). For frequency of sports watching, a single factor also appeared to be the most appropriate solution, with higher scores indicating more frequent sports watching.

All questions apart from income were compulsory. A total of 89 respondents declined to report their income, and were treated as missing cases for the bivariate analyses involving income.

Results

Bivariate Analyses

Demographics

LRs and MRs gamblers were significantly more likely to be male compared to NPs. MRs and PGs were significantly younger than NPs. MRs were significantly more likely to be single compared to NPs, while PGs were significantly less likely to be divorced, separated or widowed compared to NPs. Compared to NPs, LRs were significantly more likely to have a university or college degree as their highest level of completed education, MRs were significantly more likely not to have finished secondary education, and PGs were significantly more likely to have a university degree, but less likely to have a trade, technical certificate or diploma, or postgraduate qualifications (Table 1). No significant differences were observed for personal pre-tax income, disposable income, or main language spoken at home.

Sports Betting Behaviour

Compared to NPs, MRs and PGs bet significantly more frequently on sport. LR, MRs and PGs all had a significantly higher number of accounts with different operators compared to NPs, and also bet larger amounts. MRs and PGs bet on sports on a significantly higher number of days per month compared to NPs, and LR, MRs and PGs all placed a significantly higher number of bets on days when they did bet on sports compared to NPs. No significant differences were observed in terms of how long the respondents had been betting on sports (Table 2).

In terms of modes of betting, PGs placed a significantly lower proportion of their sports bets online compared to NPs, and MRs and PGs placed a significantly higher proportion of bets via telephone compared to NPs. No significant differences were observed in terms of proportion of bets placed via land-based venues.

Compared to NPs, MR and PG gamblers placed a significantly higher proportion of their bets after the match had started. MRs and PGs placed a significantly higher proportion of their bets on events other than the final match outcomes compared to NP, including both on key events within the match (such as which player scores first), or on micro events (such as the outcome of the next ball in cricket, or who will score next in football). LR also placed a significantly higher proportion of their bets on micro events within the match compared to NPs.

Exposure, Norms, Impulsiveness

MRs and PGs watched sports significantly more frequently than NPs, but PGs reported seeing or hearing advertisements and promotions for sports betting when they were exposed to the media significantly *less* frequently than NPs. LR, MRs and PGs reported using a significantly higher number of different types of promotions compared to NP. Compared to NPs, MRs and PGs believed that their peers spent a significantly higher amount of money on gambling, while PGs believed that their peers bet on more days, and placed more bets on a day of betting compared to NPs. LR, MR and PG gamblers all exhibited significantly higher levels of impulsivity compared to NP (Table 3).

Multivariate Analyses

In this ordinal logistic regression, variables found to be statistically significantly different between PGSI groups were included as predictors, with PGSI groups as the dependent variable (reference = non-problem gamblers). The following variables were dummy-coded: marital status (reference = married), education (reference = less than year 12 or equivalent) and gender (reference = male).

We inspected the set of predictors (described below) for possible multicollinearity. The lowest tolerance measures were for the education dummy variables (.32), and for the percentage of bets placed on the outcome of the match, for key events within the match, and for micro events within the match (~.2). All other tolerance measures were .48 or higher. Two possibilities were considered: (1) remove the variables with low tolerance or (2) run a regression that allows for multicollinearity between predictors (Le Cessie and Van Houwelingen 1992). We did both and the results were generally very similar. We report the latter approach, which was three logistic regressions with ridge estimators. These analyses

Table 2 Comparisons of sports betting behaviours between non-problem, low-risk, moderate-risk and problem gamblers (*M, SD*)

Variable	PGSI group				Inferential statistics			
	NP	LR	MR	PG	NP versus LR	NP versus MR	NP versus PG	NP versus PG
<i>n</i>	353	294	320	849				
<i>General sports betting variables</i>								
Sports betting frequency	3.47 (1.41)	3.55 (1.56)	3.79 (1.56)	4.53 (1.57)	-.62 [^]	-2.78** [^]	-11.49** [^]	
Number of years since first bet on sports	11.22 (8.82)	10.91 (8.86)	11.79 (8.41)	10.18 (6.95)	.45	-.86	1.98 [^]	
Number of accounts with different operators	1.38 (1.17)	1.82 (1.81)	2.04 (1.72)	4.76 (4.11)	-3.57** [^]	-5.76** [^]	-21.92** [^]	
Expenditure (\$, winsorised)	98.11 (204.64)	191.56 (384.92)	267.49 (439.22)	449.47 (558.95)	-3.75** [^]	-6.31** [^]	-15.93** [^]	
Number of days in a typical month on which they bet on sports	4.77 (5.37)	5.72 (5.83)	6.92 (6.10)	11.63 (8.50)	-2.15	-4.84** [^]	-16.81** [^]	
Average number of bets per day on which they bet on sports (winsorised)	2.58 (2.34)	3.49 (3.73)	3.83 (3.49)	7.74 (7.20)	-3.63** [^]	-5.41** [^]	-18.66** [^]	
<i>Sports betting modes and devices</i>								
% of sports betting conducted online	69.02 (38.70)	71.07 (36.52)	68.05 (34.29)	57.17 (31.32)	-.69 [^]	.35 [^]	5.09** [^]	
% of sports betting conducted via telephone	1.74 (7.49)	2.33 (10.78)	4.17 (12.15)	16.33 (18.83)	-.82	-3.08** [^]	-19.21** [^]	
% of sports betting conducted via land-based venue	29.52 (38.42)	26.60 (35.62)	27.79 (32.10)	26.55 (24.49)	1.00 [^]	.64 [^]	1.34 [^]	
<i>Types of sports bets</i>								
% of sports bets placed during the match (i.e., after the match has started)	6.23 (16.59)	8.03 (17.74)	12.42 (21.62)	35.41 (27.55)	1.33	4.14** [^]	22.56** [^]	
% of sports bets placed on the final match outcome	89.02 (20.77)	85.11 (23.99)	82.02 (25.92)	55.05 (30.92)	2.19 [^]	3.84** [^]	22.16** [^]	
% of sports bets placed on key events within the match (e.g., who scores the first goal)	9.09 (18.42)	11.03 (18.82)	13.51 (21.14)	25.69 (22.05)	-1.32	-2.87** [^]	-13.40** [^]	
% of sports bets placed on micro events within the match (e.g., the outcome of the next ball in cricket)	1.89 (7.09)	3.91 (12.32)	4.52 (11.81)	19.38 (20.33)	-2.49** [^]	-3.45** [^]	-22.04** [^]	

Inferential tests are Bonferroni-corrected tests, alpha = .017. Tests are independent samples *t* tests or Welch *t* tests (indicated by [^]). **p* < .017. Values in bold are significantly different to that for the non-problem group

NP non-problem, LR low risk, MR moderate risk, PG problem gamblers

Table 3 Comparisons of exposure, normative influences and impulsiveness between non-problem, low-risk, moderate-risk and problem gamblers

Variable	PGSI group			Inferential statistics			
	NP	LR	MR	PG	NP versus LR	NP versus MR	NP versus PG
<i>n</i>	353	294	320	849			
<i>Exposure to and use of promotions</i>							
Frequency of watching sports	2.45 (.97)	2.59 (.96)	2.78 (.95)	3.89 (1.36)	- 1.78	- 4.48*	- 20.71**^A
Frequency of exposure to advertisements and promotions for sports betting	2.65 (.85)	2.69 (.78)	2.68 (.77)	2.50 (.77)	- .70^A	- .57^A	2.84**^A
Number of promotions used	2.26 (2.82)	3.92 (3.27)	5.18 (3.59)	8.63 (2.68)	- 6.82**^A	- 11.67**^A	- 36.22**^A
<i>Norms</i>							
Estimated monthly expenditure by others (win-sorised)	138.80 (189.00)	171.24 (219.08)	199.70 (244.52)	293.32 (297.61)	- 2.00^A	- 3.59**^A	- 10.78**^A
Estimated number of days on which others bet on sports	7.22 (6.22)	6.74 (5.87)	7.81 (6.37)	11.76 (8.71)	1.00	- 1.22	- 10.18**^A
Estimated number of bets placed by others per typical day on which they bet on sports (winsorised)	4.51 (4.52)	5.08 (5.74)	5.00 (5.24)	8.65 (8.20)	- 1.38^A	- 1.31	- 11.19**^A
<i>Impulsiveness</i>							
BIS-Brief	1.83 (.48)	1.96 (.46)	2.13 (.49)	2.49 (.39)	- 3.45*	- 7.89*	- 22.71**^A

Inferential tests are Bonferroni-corrected tests, alpha = .017. Tests are independent samples *t* tests or Welch *t* tests (indicated by ^). **p* < .017. Values in bold are significantly different to that for the non-problem group

NP non-problem, LR low risk, MR moderate risk, PG problem gamblers

Table 4 Results from the ridge logistic regressions comparing non-problem gamblers to low-risk, moderate-risk and problem gamblers

	Low-risk gamblers				Moderate-risk gamblers				Problem gamblers						
	Est	Scaled	SE	t	p	Est	Scaled	SE	t	p	Est	Scaled	SE	t	p
(Intercept)	−1.006					−2.010					−6.905				
Gender (ref = male)	−.312	−3.690	1.195	−3.087	.002	−.669	−7.924	1.937	−4.091	<.001	−.495	−8.142	3.521	−2.312	.021
Marital status (ref = married)															
Single	.071	.840	1.159	.724	.469	.155	1.893	1.999	.947	.343	.039	.626	3.699	.169	.866
Living with partner/de facto	−.017	−.167	1.181	−.141	.888	−.189	−1.880	1.932	−.973	.330	.315	4.110	3.358	1.224	.221
Divorced/separated/widowed	−.027	−.187	1.198	−.156	.876	.238	1.688	1.905	.886	.376	.275	2.079	3.185	.653	.514
Education (ref = less than year 12)															
Year 12 or equivalent	−.005	−.056	1.095	−.051	.959	−.098	−1.058	1.915	−.552	.581	−.114	−1.696	3.724	−.455	.649
A trade, technical certificate or diploma	.016	.188	1.077	.174	.862	−.205	−2.416	1.926	−1.254	.210	−.306	−4.440	3.587	−1.238	.216
A university or college degree	.136	1.553	1.067	1.456	.145	−.291	−3.276	1.921	−1.706	.088	−.284	−4.644	3.780	−1.228	.219
Postgraduate qualifications	−.181	−1.494	1.140	−1.311	.190	−.409	−3.340	1.944	−1.718	.086	−.797	−8.370	3.607	−2.321	.020
Age	−.006	−2.058	1.161	−1.773	.076	−.007	−2.638	2.006	−1.316	.188	−.011	−4.625	3.372	−1.371	.170
Sports betting frequency	−.043	−1.628	1.180	−1.380	.167	−.080	−3.102	2.026	−1.531	.126	.041	2.270	3.766	.603	.547
Number of accounts	.065	2.496	1.196	2.088	.037	.121	4.693	2.139	2.194	.028	.069	9.170	4.923	1.863	.063
Expenditure (\$, winsorised)	.000	2.989	1.164	2.567	.010	.001	6.659	2.264	2.941	.003	.001	15.810	4.675	3.382	.001
Avg number of days on which they bet on sports	.005	.728	1.161	.627	.531	.015	2.210	2.073	1.066	.286	.033	9.636	4.256	2.264	.024
Avg number of bets per betting day (winsorised)	.041	3.182	1.195	2.662	.008	.057	4.419	2.031	2.176	.030	.065	14.951	4.739	3.155	.002
Sports watching frequency	.023	.566	1.185	.477	.633	.043	1.095	2.023	.541	.588	.216	10.572	4.221	2.505	.012
% sports bets placed online	.001	.761	1.192	.638	.523	−.002	−2.316	1.922	−1.205	.228	.001	1.304	3.430	.380	.704
% sports bets placed via telephone	.002	.450	1.201	.375	.708	.009	2.260	2.062	1.096	.273	.015	8.892	4.544	1.957	.050
% sports bets placed during the match	.000	−.011	1.194	−.009	.993	.001	.543	2.024	.269	.788	.011	10.312	4.041	2.552	.011

Table 4 (continued)

	Low-risk gamblers			Moderate-risk gamblers			Problem gamblers								
	Est	Scaled	<i>t</i>	SE	<i>t</i>	<i>p</i>	Est	Scaled	<i>t</i>	SE	<i>t</i>	<i>p</i>			
% sports bets placed on micro events within the match	.003	.753	1.192	.632	.527	.002	.503	2.007	.250	.802	.018	12.271	4.511	2.720	.007
Expenditure by peers (winsorised)	.000	1.188	1.170	1.016	.310	.000	2.484	2.018	1.231	.218	.001	8.715	3.968	2.196	.028
Avg number of days per month bet on sports by peers	-.017	-2.654	1.173	-2.262	.024	-.007	-1.206	2.002	-.603	.547	.006	1.645	3.962	.415	.678
Avg number of bets per betting day by peers (winsorised)	.016	2.131	1.175	1.814	.070	.017	2.103	1.967	1.069	.285	.023	5.971	4.275	1.397	.162
Frequency of exposure to sports betting marketing	.051	1.068	1.203	.888	.375	.062	1.300	1.890	.688	.492	-.052	-1.448	3.323	-.436	.663
Number of different promotions used	.083	6.584	1.177	5.594	<.001	.162	14.809	2.056	7.204	<.001	.265	36.560	3.810	9.595	<.001
Impulsiveness	.351	4.238	1.208	3.509	<.001	1.001	13.121	1.970	6.661	<.001	2.239	40.092	3.654	10.973	<.001

Est, estimate; Scaled, scaled estimate; SE, standard error of scaled estimate; *t*, *t* value; *p*, *p* value

were conducted in R (v3.3.3) using the `logisticRidge` command in the `ridge` package, which automatically chooses the most appropriate lambda (Cule and De Iorio 2013). The results are indicated in Table 4.

Controlling for all other variables, gender was a significant factor, with males significantly more likely to be LRs, MRs or PGs, compared to NP gamblers. Controlling for other variables, age and the marital status dummy variables did not significantly differentiate the groups. Education was a significant risk factor only for PGs, who were significantly less likely to have a postgraduate education (compared to the reference group of those who completed less than year 12).

In terms of sports betting variables, no significant differences were observed for sports betting frequency for any of the risk groups. LRs and MRs had a significantly higher number of accounts with different operators compared to NPs (no significant difference for PG vs NP, $p = .063$). MR and PG reported significantly higher sports betting expenditure than NP when controlling for the other variables in the model. PGs placed bets on significantly more days per month compared to NP, placed a significantly higher proportion of bets during the match, and on micro events within the match. No significant differences were observed in terms of the percentage of bets placed online or via the telephone, likely due to the presence of other in-play betting variables in the model.

PGs reported that their peers bet a significantly higher amount of money than that reported by NPs, and LRs reported that their peers bet on significantly fewer days per month compared to NPs. No significant differences were observed for any of the groups in terms of frequency of exposure to advertisements or promotions for sports betting. However, LRs, MRs and PGs reported using a significantly higher number of different types of promotions than NPs.

Finally, all groups (LR, MR and PG) had significantly higher impulsiveness scores than NP gamblers (Table 4).

Discussion

In general, the findings support some of the literature on risk factors for problem gambling, particularly amongst sports bettors, while also adding to this previous knowledge by exploring not just problem gamblers, but all risk groups.

Demographic Risk Factors

Consistent with the previous literature (e.g., Blaszczynski and Hunt 2011), gender was a risk factor for problem gambling. The bivariate results, however, indicate that PGs are not necessarily more likely to be male compared to NPs, and that gender differences in previous studies may in part be due to studying MRs and PGs together. However, the multivariate results indicate that, when controlling for other factors, males are overrepresented in all gambling risk groups compared to NP sports bettors.

In the bivariate results, age (specifically, being younger) was a significant risk factor for MRs and PGs, but not LRs, which is consistent with concerns raised by researchers such as Lamont et al. (2011), McMullan (2011) and Thomas et al. (2012a, b). The multivariate results, however, found that age was not a significant risk factor for problem gambling. It is possible that this is because age is correlated with other predictors in the model, such as marital status and education (Delfabbro 2012).

Neither personal pre-tax income nor disposable income differed significantly across PGSI groups. While income is generally related to problem gambling when all forms are considered (Delfabbro 2012; Williams et al. 2012a, b), the present finding is consistent with the study specifically on sports bettors by Hing et al. (2016), which also found no significant relationship between income and all levels of problem gambling. Disposable income was of interest because online gamblers tend to have more disposable income (Gainsbury 2012), and online gambling is associated with gambling-related problems (Gainsbury et al. 2013; Wardle et al. 2011; Wood and Williams 2010). However, in the present study, no significant relationship was found. These findings may partially be due to the fact that sports betting tends to be conducted by those who already have a higher level of income compared to other gamblers (Delfabbro 2012), and thus there are no real differences to find. Or it could indicate that problem gambling can occur for sports bettors of all incomes.

The marital status results are consistent with previous studies, such as Hing et al. (2016), in that higher levels of problem gambling are related to being single, or not being divorced/separated/widowed. However, as Delfabbro (2012) notes, such a finding is likely to be related to the lower age of respondents in higher risk groups, with younger people in general being less likely to have experienced divorce, separation, or being widowed.

The relationship between education and gambling risk groups potentially suggests that gambling-related problems and education are not related in a linear fashion. For example, MRs were significantly more likely to have not finished school compared to NPs, while PGs were significantly more likely to have an undergraduate degree. Therefore, the relationship between level of education and problem gambling may be more complex than a linear relationship.

The present results found that ethnic minority status was not a significant risk factor for gambling-related problems, in contrast with findings for online gamblers (Hing et al. 2014b). In the present study, this was examined by exploring the main language spoken at home, and approximately 98% of the sample spoke English as their main language. This may indicate that the social nature of sports betting (Gordon et al. 2015; Sproston et al. 2015) may make it less attractive to those who may experience a language barrier, as they may not have access to important information such as tips from colleagues. Instead, they may engage in other forms of gambling where lower levels of communication are not an issue (such as electronic gaming machines), or in forms where non-verbal communication is possible (most casino table games).

Sports Betting Behaviours and Impulsivity

In general, higher levels of sports betting participation were risk factors for MRs and PGs (generally consistent with Hing et al. 2016). LRs were also significantly more likely to be more involved sports bettors in some ways than NPs, including placing more bets on a typical day of betting, and to have accounts with more operators than NPs (consistent with Gainsbury et al. 2015). Taken together, the results support the general finding that those who are more involved in sports betting, particularly in terms of frequency and expenditure, are significantly more likely to experience gambling-related problems, even at lower levels of risk.

In terms of modes of access for sports betting, PGs place a significantly lower proportion of their bets online compared to NPs, but both MRs and PGs place a higher proportion of their bets via the telephone. This is likely related to the finding that MRs and PGs place

a significantly higher proportion of their bets after the match has started, on key events or micro events within the match. These bets can only be placed via the telephone, so the differences in modes likely reflect the different nature of bets that are placed by sports bettors in higher risk groups. These bets are only available for a short period of time and are therefore more likely to be placed on impulse compared to bets that are placed before the match begins. Together with the finding that sports bettors at any risk level are significantly higher in impulsiveness compared to NPs, these results suggest a clear relationship between impulse betting and all levels of problem gambling, consistent with van Holst et al. (2010), particularly given that highly involved sports bettors tend to be heavily involved in in-play betting (LaBrie et al. 2007; LaPlante et al. 2008). However, no causal relationship can be drawn from the current research design.

Exposure to Marketing Activity

MR and PG sports bettors watched sports significantly more frequently than NPs but PGs reported noticing significantly fewer messages than NP sports bettors when they were exposed to the media. It could be the case that PGs watch sport through different media, which contain fewer advertisements. It may also be that selective perception is at work, as PGs selectively screen out messages because of their high involvement and exposure to the messages, while for NPs their lower involvement raises awareness of the advertising messages.

However, promotions are clearly used more by those at higher risk levels. All risk levels (LR, MR and PG) used a significantly higher number of different types of promotions, with PGs reporting, on average, that they use 8.6 out of 10 possible types of promotions, and these promotions may be part of the reason that sports bettors in higher risk levels are more engaged gamblers (see Binde 2014).

Norms

With the levels of sports betting increasing in Australia, and given that discussions around sports betting in workplaces and social settings appear to be commonplace (Sproston et al. 2015) and that sports bettors tend to cluster in lifestyle consumption communities (Gordon et al. 2015), it is unsurprising that MRs and PGs think that others of their age and gender bet more often than NP sports bettors perceive their peers to bet. Given that these questions asked about others of the same age and gender, and given that there are age and gender differences between the risk groups, it is possible that such a result reflects reality to an extent. However, it also indicates that MRs and PGs in particular believe that a higher level of sports betting occurs amongst their peers, which may lead them to believe that this is acceptable for them, too. Several studies have found that higher risk gamblers tend to overestimate how much their peers gamble, and have therefore advocated the use of social-norms based interventions as a harm minimisation strategy (Cunningham et al. 2009; Larimer and Neighbors 2003; Neighbors et al. 2015).

Limitations

Limitations for this study include that the study was a self-report survey, and while reliable measures were used where possible, such surveys are always open to concerns around factors such as honesty, recall and introspective ability. However, given that the results

generally align with previous gambling research, these concerns are somewhat alleviated. The study was only conducted on respondents who lived in Australia, where certain laws are in effect around in-play betting (e.g., in-play bets cannot be placed online on domestically-regulated sites) and thus may not generalise to other countries. Finally, the study was cross-sectional and no causal directions can be inferred. Where possible, it would be useful for future research to collect longitudinal data to determine rates of change and factors related to change between gambling risk groups.

Conclusion

This study has examined risk factors for low risk, moderate risk and problem gamblers amongst a sample of sports bettors. Taken together, the results indicate that some risk factors are relevant to all levels of problem gambling severity, and some are only relevant to those with severe gambling problems. In general, those at any level of gambling risk tend to be younger, male, more engaged sports bettors, who use more promotions and place a higher proportion of their bets on in-play betting. They are impulsive, and may either be surrounded by peers who bet often, or at least think that their peers bet often. Specific risk factors for MRs and PGs include even higher levels of sports betting involvement, such as betting on contingencies other than the final outcome of the match (e.g., on key or micro events within the match), placing a higher proportion of bets via the telephone, watching sports more often, and reporting that their peers are also more involved gamblers than those of NPs. These findings indicate that interventions aimed at prevention, harm minimisation and treatment for sports betting problems should target young adult males. They should also caution against placing bets on impulse and specifically in-play betting. Publicising normative behaviour on sports betting frequency and expenditure for different demographic groups would enable comparisons to be made, and may assist those exceeding these norms to reconsider their betting engagement. Wagering operators could provide personalised feedback to sports bettors based on their actual online betting activity, and provide normative data for comparison. Caution is required however to deter sports bettors who bet less than their peers from increasing their betting in order to reach normative levels.

The novel aspect of this study is that the results are separated by PGSI group, indicating that some risk factors are relevant even to lower risk gamblers. Given that much of the population level harm due to gambling is caused by lower risk gambling (Browne et al. 2016), it is crucial to understand these risk factors at each risk level. This level of insight is often not available due to relatively small samples and the relative rarity of problem gamblers. As such, this study provides a unique insight into the demographic, behavioural, marketing, normative and impulsiveness risk factors for each level of gambling risk.

Acknowledgements This study was funded by internal funding from the Centre for Gambling Education and Research at Southern Cross University. The lead author was a member of this Centre at the time that the data were collected.

Compliance with Ethical Standards

Conflict of interest Alex Russell has received funding from industry and government sources. Industry funding was for an evaluation of problem gambling amongst casino employees from Echo/Star Entertainment Group. Government funding has been obtained from: Victorian Responsible Gambling Foundation; Queensland Justice and Attorney-General; Gambling Research Australia and the Alberta Gambling Research Insti-

tute. He is also affiliated with the University of Sydney. He declares no conflicts of interest in relation to this manuscript. Nerilee Hing has received research funds from the Victorian Responsible Gambling Foundation, Gambling Research Australia, Australian Government Department of Social Services, Alberta Gambling Research Institute, the Australian Gambling Research Centre and the Queensland, New South Wales, Victorian and South Australian Governments. She has also received consultancy funds from Echo Entertainment and Sportsbet and an honorarium from Singapore Pools for membership of its International Advisory Committee. She declares that she has no conflicts of interest in relation to this manuscript. En Li has received research grants from the Victorian Responsible Gambling Foundation and Gambling Research Australia. He declares that he has no conflicts of interest in relation to this manuscript. Peter Vitartas has received research funds from the Queensland Department of Justice and Attorney-General and declares no conflicts of interest in relation to this manuscript.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

References

- Adami, N., Benini, S., Boschetti, A., Canini, L., Maione, F., & Temporin, M. (2013). Markers of unsustainable gambling for early detection of at-risk online gamblers. *International Gambling Studies*, 13(2), 188–204. <https://doi.org/10.1080/14459795.2012.754919>.
- Amos, C., Holmes, G. R., & Keneson, W. C. (2014). A meta-analysis of consumer impulse buying. *Journal of Retailing and Consumer Services*, 21(2), 86–97. <https://doi.org/10.1016/j.jretconser.2013.11.004>.
- Australian Communication and Media Authority (ACMA). (2013). *Betting odds and advertising for betting agencies during sports*. Canberra. http://www.acma.gov.au/~media/mediacomms/Report/pdf/Community_attitudes_to_live_odds_and_sport_pdf1%20pdf.pdf.
- Binde, P. (2009). Exploring the impact of gambling advertising: An interview study of problem gamblers. *International Journal of Mental Health and Addiction*, 7(4), 541. <https://doi.org/10.1007/s11469-008-9186-9>.
- Binde, P. (2014). *Gambling advertising: A critical research review*. London: Responsible Gambling Trust. https://about.gambleaware.org/media/1165/binde_rgt_report_gambling_advertising_2014_final_color_115p.pdf.
- Blaszczynski, A., & Hunt, C. (2011). *Online sports betting has created new generation of problem gamblers*. The University of Sydney. <http://sydney.edu.au/news/84.html?newsstoryid=6545>. Accessed 6 July 2017.
- Braverman, J., LaPlante, D. A., Nelson, S. E., & Shaffer, H. J. (2013). Using cross-game behavioral markers for early identification of high-risk internet gamblers. *Psychology of Addictive Behaviors*, 27(3), 868–877. <https://doi.org/10.1037/a0032818>.
- Braverman, J., & Shaffer, H. J. (2012). How do gamblers start gambling: Identifying behavioural markers for high-risk internet gambling. *European Journal of Public Health*, 22(2), 273–278. <https://doi.org/10.1093/eurpub/ckp232>.
- Brosowski, T., Meyer, G., & Hayer, T. (2012). Analyses of multiple types of online gambling within one provider: An extended evaluation framework of actual online gambling behaviour. *International Gambling Studies*, 12(3), 405–419. <https://doi.org/10.1080/14459795.2012.698295>.
- Browne, M., Langham, E., Rawat, V., Greer, N., Li, E., Rose, J., et al. (2016). *Assessing gambling-related harm in Victoria: A public health perspective*. Melbourne: Victorian Responsible Gambling Foundation.
- Cule, E., & De Iorio, M. (2013). Ridge regression in prediction problems: Automatic choice of the ridge parameter. *Genetic Epidemiology*, 37(7), 704–714. <https://doi.org/10.1002/gepi.21750>.
- Cunningham, J. A., Hodgins, D. C., Toneatto, T., Rai, A., & Cordingley, J. (2009). Pilot study of a personalized feedback intervention for problem gamblers. *Behavior Therapy*, 40(3), 219–224. <https://doi.org/10.1016/j.beth.2008.06.005>.
- Delfabbro, P. H. (2012). *Australasian gambling review—5th edition—Independent gambling*. Adelaide: Independent Gambling Authority. <http://iga.sa.gov.au/sites/default/files/publication-documents/Australian%20Gambling%20Review-5th%20Edition.pdf>.
- Fang, X., Singh, S., & Ahluwalia, R. (2007). An examination of different explanations for the Mere Exposure Effect. *The Journal of Consumer Research*, 34(1), 97–103. <https://doi.org/10.1086/513050>.

- Ferris, J. A., & Wynne, H. J. (2001). *The Canadian problem gambling index: Final report*. Ottawa: Canadian Centre on Substance Abuse.
- Foley-Train, J. (2014). *Sports betting: Commercial and integrity issues*. Association of British Bookmakers, European Gaming and Betting Association, European Sport Security Association and Remote Gambling Association. <http://www.egba.eu/media/Sports-Betting-Report-FINAL.pdf>. Accessed 7 July 2017.
- Gainsbury, S. M. (2012). *Internet gambling: Current research findings and implications*. New York: Springer.
- Gainsbury, S. M., Delfabbro, P., King, D. L., & Hing, N. (2016a). An exploratory study of gambling operators' use of social media and the latent messages conveyed. *Journal of Gambling Studies*, 32(1), 125. <https://doi.org/10.1007/s10899-015-9525-2>.
- Gainsbury, S. M., Liu, Y., Russell, A. M. T., & Teichert, T. (2016b). Is all Internet gambling equally problematic? Considering the relationship between mode of access and gambling problems. *Computers in Human Behavior*, 55(Part B), 717–728. <https://doi.org/10.1016/j.chb.2015.10.006>.
- Gainsbury, S. M., Russell, A., Blaszczynski, A., & Hing, N. (2015). Greater involvement and diversity of Internet gambling as a risk factor for problem gambling. *European Journal of Public Health*, 25(4), 723. <https://doi.org/10.1093/eurpub/ckv006>.
- Gainsbury, S. M., Russell, A., Hing, N., Wood, R., & Blaszczynski, A. (2013). The impact of internet gambling on gambling problems: A comparison of moderate-risk and problem Internet and non-Internet gamblers. *Psychology of Addictive Behaviors*, 27(4), 1092–1101. <https://doi.org/10.1037/a0031475>.
- Global Betting and Gaming Consultants (GBGC). (2013). *Global sports betting: The state of play*. <http://www.gbgc.com/global-sports-betting-the-state-of-play/>. Accessed 21 January 2015.
- Gordon, R., Gurrieri, L., & Chapman, M. (2015). Broadening an understanding of problem gambling: The lifestyle consumption community of sports betting. *Journal of Business Research*, 68(10), 2164–2172. <https://doi.org/10.1016/j.jbusres.2015.03.016>.
- Gray, H. M., LaPlante, D. A., & Shaffer, H. J. (2012). Behavioral characteristics of Internet gamblers who trigger corporate responsible gambling interventions. *Psychology of Addictive Behaviors*, 26(3), 527–535. <https://doi.org/10.1037/a0028545>.
- Hing, N., Cherney, L., Blaszczynski, A., Gainsbury, S. M., & Lubman, D. I. (2014a). Do advertising and promotions for online gambling increase gambling consumption? An exploratory study. *International Gambling Studies*, 14(3), 394–409. <https://doi.org/10.1080/14459795.2014.903989>.
- Hing, N., Gainsbury, S., Blaszczynski, A., Wood, R., Lubman, D., & Russell, A. (2014b). *Interactive gambling*. Melbourne: Gambling Research Australia.
- Hing, N., Lamont, M., Fink, E., & Vitartas, P. (2015). Sports-embedded gambling promotions: A study of exposure, sports betting intention and problem gambling amongst adults. *International Journal of Mental Health and Addiction*, 13(1), 115–135. <https://doi.org/10.1007/s11469-014-9519-9>.
- Hing, N., Russell, A. M., & Browne, M. (2017a). Risk factors for gambling problems on online electronic gaming machines, race betting and sports betting. *Frontiers in Psychology*, 8, 779. <https://doi.org/10.3389/fpsyg.2017.00779>.
- Hing, N., Russell, A. M. T., Lamont, M., & Vitartas, P. (2017b). Bet anywhere, anytime: An analysis of Internet sports bettors' responses to gambling promotions during sports broadcasts by problem gambling severity. *Journal of Gambling Studies*. <https://doi.org/10.1007/s10899-017-9671-9>.
- Hing, N., Russell, A. M. T., Vitartas, P., & Lamont, M. (2016). Demographic, behavioural and normative risk factors for gambling problems amongst sports bettors. *Journal of Gambling Studies*, 32(2), 625–641. <https://doi.org/10.1007/s10899-015-9571-9>.
- Hing, N., Vitartas, P., & Lamont, M. (2014c). *Promotion of gambling and live betting odds during televised sport: Influences on gambling participation and problem gambling*. Brisbane: Queensland Department of Justice and Attorney-General. <https://doi.org/10.13140/2.1.1643.8087>.
- Humphreys, B. R., & Pérez, L. (2012). Who bets on sports? Characteristics of sports bettors and the consequences of expanding sports betting opportunities. *Estudios de Economía Aplicada*, 30(2), 579–597.
- Johansson, A., Grant, J. E., Kim, S. W., Odlaug, B. L., & Gøtestam, K. G. (2009). Risk factors for problematic gambling: A critical literature review. *Journal of Gambling Studies*, 25(1), 67–92. <https://doi.org/10.1007/s10899-008-9088-6>.
- LaBrie, R. A., LaPlante, D. A., Nelson, S. E., Schumann, A., & Shaffer, H. J. (2007). Assessing the playing field: A prospective longitudinal study of internet sports gambling behavior. *Journal of Gambling Studies*, 23(3), 347–362. <https://doi.org/10.1007/s10899-007-9067-3>.
- LaBrie, R. A., & Shaffer, H. J. (2011). Identifying behavioral markers of disordered Internet sports gambling. *Addiction Research & Theory*, 19(1), 56–65. <https://doi.org/10.3109/16066359.2010.512106>.

- Lamont, M., Hing, N., & Gainsbury, S. (2011). Gambling on sport sponsorship: A conceptual framework for research and regulatory review. *Sport Management Review*, 14(3), 246–257. <https://doi.org/10.1016/j.smr.2011.04.004>.
- LaPlante, D. A., Nelson, S. E., & Gray, H. M. (2014). Breadth and depth involvement: Understanding Internet gambling involvement and its relationship to gambling problems. *Psychology of Addictive Behaviors*, 28(2), 396–403. <https://doi.org/10.1037/a0033810>.
- LaPlante, D. A., Schumann, A., LaBrie, R. A., & Shaffer, H. J. (2008). Population trends in Internet sports gambling. *Computers in Human Behavior*, 24(5), 2399–2414. <https://doi.org/10.1016/j.chb.2008.02.015>.
- Larimer, M. E., & Neighbors, C. (2003). Normative misperception and the impact of descriptive and injunctive norms on college student gambling. *Psychology of Addictive Behaviors*, 17(3), 235–243. <https://doi.org/10.1037/0893-164X.17.3.235>.
- Le Cessie, S., & Van Houwelingen, J. C. (1992). Ridge estimators in logistic regression. *Journal of the Royal Statistical Society. Series C Applied Statistics*, 41(1), 191–201. <https://doi.org/10.2307/2347628>.
- Lopez-Gonzalez, H., Estévez, A., & Griffiths, M. D. (2017). Marketing and advertising online sports betting: A problem gambling perspective. *Journal of Sport & Social Issues*, 41(3), 256–272. <https://doi.org/10.1177/0193723517705545>.
- Martin, I. M., Kamins, M. A., Pirouz, D. M., Davis, S. W., Haws, K. L., Mirabito, A. M., et al. (2013). On the road to addiction: The facilitative and preventive roles of marketing cues. *Journal of Business Research*, 66(8), 1219–1226. <https://doi.org/10.1016/j.jbusres.2012.08.015>.
- McMullan, J. (2011). *Submission to the joint select committee on gambling reform inquiry into interactive gambling*. <http://www.aph.gov.au/DocumentStore.ashx?id=40e3c180-5666-4084-92c6-0e51b62d7d0b>. Accessed 30 January 2015.
- Milner, L., Hing, N., Vitartas, P., & Lamont, M. J. (2013). Embedded gambling promotion in Australian football broadcasts: An exploratory study. *Communication, Politics & Culture*, 46(2), 177–198. Accessed 5 July 2017.
- Neighbors, C., Rodriguez, L. M., Rinker, D. V., Gonzales, R. G., Agana, M., Tackett, J. L., et al. (2015). Efficacy of personalized normative feedback as a brief intervention for college student gambling: A randomized controlled trial. *Journal of Consulting and Clinical Psychology*, 83(3), 500–511. <https://doi.org/10.1037/a0039125>.
- Nelson, S. E., LaPlante, D. A., Peller, A. J., Schumann, A., LaBrie, R. A., & Shaffer, H. J. (2008). Real limits in the virtual world: Self-limiting behavior of Internet gamblers. *Journal of Gambling Studies*, 24(4), 463–477. <https://doi.org/10.1007/s10899-008-9106-8>.
- Pratkanis, A. R., & Greenwald, A. G. (1993). Consumer involvement, message attention, and the persistence of persuasive impact in a message-dense environment. *Psychology and Marketing*, 10(4), 321–332. <https://doi.org/10.1002/mar.4220100406>.
- Rook, D. W. (1987). The buying impulse. *The Journal of Consumer Research*, 14(2), 189–199.
- Rook, D. W., & Fisher, R. J. (1995). Normative influences on impulsive buying behavior. *The Journal of Consumer Research*, 22(3), 305–313. <https://doi.org/10.1086/209452>.
- Ruxton, G. D. (2006). The unequal variance t-test is an underused alternative to Student's t-test and the Mann–Whitney U test. *Behavioral Ecology*, 17(4), 688–690. Accessed 5 July 2017.
- Salkind, N. J. (2010). *Encyclopedia of research design*. London: SAGE Publications. <https://books.google.com.au/books?id=pv01SauGirsC>.
- Sharma, P., Sivakumaran, B., & Marshall, R. (2010). Impulse buying and variety seeking: A trait-correlates perspective. *Journal of Business Research*, 63(3), 276–283. <https://doi.org/10.1016/j.jbusres.2009.03.013>.
- Sproston, K., Hanley, C., Brook, K., Hing, N., & Gainsbury, S. (2015). *Marketing of sports betting and racing*. Melbourne: Gambling Research Australia.
- Sproston, K., Hing, N., & Palankay, C. (2012). *Prevalence of gambling and problem gambling in New South Wales*. Sydney: NSW Office of Liquor, Gaming and Racing.
- Steinberg, L., Sharp, C., Stanford, M. S., & Tharp, A. T. (2013). New tricks for an old measure: The development of the Barratt Impulsiveness Scale-Brief (BIS-Brief). *Psychological Assessment*, 25(1), 216–226. <https://doi.org/10.1037/a0030550>.
- Thomas, S. L., Lewis, S., Duong, J., & McLeod, C. (2012a). Sports betting marketing during sporting events: A stadium and broadcast census of Australian Football League matches. *Australian and New Zealand Journal of Public Health*, 36(2), 145–152. <https://doi.org/10.1111/j.1753-6405.2012.00856.x>.
- Thomas, S. L., Lewis, S., McLeod, C., & Haycock, J. (2012b). “They are working every angle”: A qualitative study of Australian adults’ attitudes towards, and interactions with, gambling industry marketing strategies. *International Gambling Studies*, 12(1), 111–127. <https://doi.org/10.1080/14459795.2011.639381>.

- van Holst, R. J., van den Brink, W., Veltman, D. J., & Goudriaan, A. E. (2010). Why gamblers fail to win: A review of cognitive and neuroimaging findings in pathological gambling. *Neuroscience and Biobehavioral Reviews*, *34*(1), 87–107. <https://doi.org/10.1016/j.neubiorev.2009.07.007>.
- Verplanken, B., & Herabadi, A. (2001). Individual differences in impulse buying tendency: Feeling and no thinking. *European Journal of Personality*, *15*(S1), S71–S83. <https://doi.org/10.1002/per.423>.
- Vitaro, F., Arseneault, L., & Tremblay, R. E. (1997). Dispositional predictors of problem gambling in male adolescents. *The American Journal of Psychiatry*, *154*(12), 1769–1770. <https://doi.org/10.1176/ajp.154.12.1769>.
- Wardle, H., Moody, A., Griffiths, M., Orford, J., & Volberg, R. (2011). Defining the online gambler and patterns of behaviour integration: Evidence from the British Gambling Prevalence Survey 2010. *International Gambling Studies*, *11*(3), 339–356. <https://doi.org/10.1080/14459795.2011.628684>.
- Wardle, H., & Seabury, C. (2012). *Gambling behaviour*. In Health survey for England-2012 (Chapter 7). <http://www.hscic.gov.uk/catalogue/PUB13218/HSE2012-Ch7-Gambling-behaviour.pdf>. Accessed 21 January 2015.
- Williams, R. J., Volberg, R. A., & Stevens, R. (2012a). *The population prevalence of problem gambling: Methodological influences, standardized, rates, jurisdictional differences, and worldwide trends*. Guelph: Ontario Problem Gambling Research Centre and the Ontario Ministry of Health and Long Term Care.
- Williams, R. J., West, B. L., & Simpson, R. I. (2012b). *Prevention of problem gambling: A comprehensive review of the evidence*. Guelph: Ontario Problem Gambling Research Centre.
- Wood, R. T., & Williams, R. (2010). *Internet gambling: Prevalence, patterns, problems, and policy options*. Guelph: Ontario Problem Gambling Research Centre.
- Xuan, Z., & Shaffer, H. (2009). How do gamblers end gambling: Longitudinal analysis of Internet gambling behaviors prior to account closure due to gambling related problems. *Journal of Gambling Studies*, *25*(2), 239–252. <https://doi.org/10.1007/s10899-009-9118-z>.
- Youn, S., & Faber, R. J. (2000). Impulse buying: Its relation to personality traits and cues. *Advances in Consumer Research*, *27*(1), 179–185.

Terms and Conditions

Springer Nature journal content, brought to you courtesy of Springer Nature Customer Service Center GmbH (“Springer Nature”).

Springer Nature supports a reasonable amount of sharing of research papers by authors, subscribers and authorised users (“Users”), for small-scale personal, non-commercial use provided that all copyright, trade and service marks and other proprietary notices are maintained. By accessing, sharing, receiving or otherwise using the Springer Nature journal content you agree to these terms of use (“Terms”). For these purposes, Springer Nature considers academic use (by researchers and students) to be non-commercial.

These Terms are supplementary and will apply in addition to any applicable website terms and conditions, a relevant site licence or a personal subscription. These Terms will prevail over any conflict or ambiguity with regards to the relevant terms, a site licence or a personal subscription (to the extent of the conflict or ambiguity only). For Creative Commons-licensed articles, the terms of the Creative Commons license used will apply.

We collect and use personal data to provide access to the Springer Nature journal content. We may also use these personal data internally within ResearchGate and Springer Nature and as agreed share it, in an anonymised way, for purposes of tracking, analysis and reporting. We will not otherwise disclose your personal data outside the ResearchGate or the Springer Nature group of companies unless we have your permission as detailed in the Privacy Policy.

While Users may use the Springer Nature journal content for small scale, personal non-commercial use, it is important to note that Users may not:

1. use such content for the purpose of providing other users with access on a regular or large scale basis or as a means to circumvent access control;
2. use such content where to do so would be considered a criminal or statutory offence in any jurisdiction, or gives rise to civil liability, or is otherwise unlawful;
3. falsely or misleadingly imply or suggest endorsement, approval, sponsorship, or association unless explicitly agreed to by Springer Nature in writing;
4. use bots or other automated methods to access the content or redirect messages
5. override any security feature or exclusionary protocol; or
6. share the content in order to create substitute for Springer Nature products or services or a systematic database of Springer Nature journal content.

In line with the restriction against commercial use, Springer Nature does not permit the creation of a product or service that creates revenue, royalties, rent or income from our content or its inclusion as part of a paid for service or for other commercial gain. Springer Nature journal content cannot be used for inter-library loans and librarians may not upload Springer Nature journal content on a large scale into their, or any other, institutional repository.

These terms of use are reviewed regularly and may be amended at any time. Springer Nature is not obligated to publish any information or content on this website and may remove it or features or functionality at our sole discretion, at any time with or without notice. Springer Nature may revoke this licence to you at any time and remove access to any copies of the Springer Nature journal content which have been saved.

To the fullest extent permitted by law, Springer Nature makes no warranties, representations or guarantees to Users, either express or implied with respect to the Springer nature journal content and all parties disclaim and waive any implied warranties or warranties imposed by law, including merchantability or fitness for any particular purpose.

Please note that these rights do not automatically extend to content, data or other material published by Springer Nature that may be licensed from third parties.

If you would like to use or distribute our Springer Nature journal content to a wider audience or on a regular basis or in any other manner not expressly permitted by these Terms, please contact Springer Nature at

onlineservice@springernature.com