

More frequent use of live sports-betting features is associated with increased risk of gambling harm: Evidence from a case-control design

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BRIEF REPORT



ABSTRACT

Background: Many theories of gambling harm propose that some design features of interactive sports-betting platforms confer a risk of harm by enabling cyclical patterns of repeated gambling engagement. This exploratory study investigated whether such features were used more frequently by people at higher risk of gambling harm relative to a demographically matched lower-risk control group. **Methods:** This study used a case-control design to compare 85 people at higher risk of gambling harm (PGSI 5+) with an age- and gender-matched control group at lower risk of harm ($n = 84$, PGSI 0–4). We compared the frequency with which groups self-reported using in-play betting, cash-out, multi bets, proposition bets, social betting, and viewing live matches within a betting app. **Results:** The higher-risk group reported more frequent use of in-play betting and instant cash-out and were more likely to report streaming live sporting events within a betting app. Higher-risk participants were also more likely to make an immediate deposit to qualify for a marketing offer, and both groups reported being more likely to make risky bets when using bonus funds. We observed no group differences in the frequency of use of multi bets, proposition-bets, or social betting. **Conclusions:** Our findings were broadly consistent with the theory that design features of betting platforms that facilitate continuous engagement contribute to gambling harm. A notable finding was that in-app streaming of live events was more common among people at higher risk of harm, consistent with a novel prediction made by the motivating theory.

KEYWORDS

gambling, structural characteristics, sports betting, inducements, product design, live-streaming

INTRODUCTION

People who experience harm from sports or race betting often report more frequent use of live or in-play betting (Gainsbury, Abarbanel, & Blaszczynski, 2020; Hing, Russell, Vitartas, & Lamont, 2016; Vieira et al., 2023), micro betting (Quintero & Vaccarino, 2024; Russell, Hing, Browne, Li, & Vitartas, 2019), and instant cash-out (Lopez-Gonzalez, Estévez, & Griffiths, 2019; Sinclair, Clark, Wohl, Keough, & Kim, 2024). One hypothesis is that these structural characteristics cause gambling harm by enabling high-risk betting behaviours (Hing et al., 2015; Killick & Griffiths, 2019; Lopez-Gonzalez, Estévez, & Griffiths, 2017; Newall, Russell, & Hing, 2021). Parke and Parke (2019) have observed how many product design features converge to facilitate a cyclical pattern of continuous betting they call the ‘Online Sports Betting Loop’. For example, most betting apps allow for a frictionless recycling of winnings into subsequent bets, while facilitating further liquidity of funds via immediate electronic deposits, cashout offers, and withdrawal reversals. Similarly, micro and in-play bets may support continuous engagement by offering a constant supply of new betting opportunities

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with short intervals between a bet and its outcome, and notification-based marketing offers may prompt people to (re)-initiate a gambling session from a mobile device (Russell, Hing, Browne, & Rawat, 2018).

It is also conceivable, however, that the apparent associations between product use and gambling harm are spurious, caused by confounding among variables. An illustrative example is that young people—and young men in particular—tend to experience higher rates of sports gambling harm (Hing et al., 2016; Tulloch et al., 2024). However, this cohort is also more likely to adopt new digital technologies (Laukkanen & Pasanen, 2008), including online betting (Hing et al., 2021). These demographic differences in technology use might therefore explain the apparent association between the use of newer product features and gambling harm.

To control for potential confounding by age and gender, this study used a case-control design to test if the association between gambling harm and frequent use of these structural characteristics persisted when comparing two groups of at-least-monthly bettors that were comparable in terms of age and gender, but differed in their levels of gambling harm. We also aimed to extend on previous work by testing a novel prediction of Parke & Parke's *Online Sports Betting Loop* theory. Many betting apps now offer video streaming of live sporting events. This could facilitate the sports betting loop because it would sustain attention on a betting app, and because footage may be displayed alongside promotions, live odds or other prompts to place a bet. We therefore predicted more frequent use of in-app streaming of live events among those who report riskier betting.

METHOD

Procedure

We used a case-control design to compare people who reported more severe gambling problems (PGSI 5+) with a demographically matched control group (PGSI 0–4). All participants bet on sports or races at least monthly. Participants were recruited online via Prolific and paid \$10.67 (AUD).

We used a two-phase recruitment process to identify eligible participants and match cases with controls. In Phase One, 1,600 individuals meeting basic eligibility criteria (≥ 18 years old, Australian resident, unimpaired or corrected vision) completed a screening survey. 339 passed attention checks and met the eligibility criteria of at least monthly sport or race betting (see recruitment flowchart in [Supplementary Figure S1](#)).

In Phase Two, participants with a PGSI score ≥ 5 were recontacted and invited to complete a follow-up survey and a behavioural gambling task (unrelated to this study). We then invited control participants (PGSI 0–4) from the same screening sample who were approximately matched to PGSI 5+ participants on gender and age (across 3 strata: 15–35 years, 36–50 years, and >50 years; groups were matched by mean age and age variance). 181 participants completed the second phase by the closing date (July 30th, 2024). Of these, 12 were excluded (see [Supplementary](#)

[Figure S1](#)), leaving 169 participants for analysis: 84 in the lower-risk group and 85 in the higher-risk group, demographics are reported in [Table 1](#) and [S2](#).

Measures

All survey instruments are provided in the [supplementary materials](#).

Phase One. The Phase One survey assessed age, gender, education level, subjective socioeconomic status (SES; Adler, Epel, Castellazzo, & Ickovics, 2000), sports/race betting frequency, and the Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001). The PGSI is a widely used and validated screening tool designed to measure risky gambling behaviours and adverse gambling-related consequences. Higher-risk individuals were identified using a PGSI threshold of 5. This threshold has been reported to improve both congruency with clinical assessment (Williams & Volberg, 2014) and classification stability over time (Currie, Hodgins, & Casey, 2013), relative to the original but more conservative threshold of 8.

Phase Two. In Phase Two, participants reported on their use of sports/race betting products during the previous 12 months. These questions covered use of specific product features including in-play betting, instant cash-out, social betting, proposition bets, multi bets, and in-app streaming of live events. A definition was provided along with these items to aid comprehension. Other questions concerned the influence of marketing offers, betting under the influence of alcohol, impacts on sleep, and whether they gambled with friends or family. Phase Two also included questions about ancestry, sexual orientation, femininity and masculinity (Kachel, Steffens, & Niedlich, 2016), languages spoken with family, employment, and parental experience of gambling-related harm.

Statistical analysis

Between-group differences were analysed using non-parametric statistics: chi-square tests of independence for categorical variables and Mann-Whitney *U* tests for ordinal and count variables. Alongside Mann-Whitney *U* tests, we computed a non-parametric *common language effect size* (CLES), which indicates the probability that a randomly selected observation from the PGSI 5+ group would exceed the rank of a randomly selected observation in the PGSI 0–4 group. A post-hoc power simulation indicated approximately 85% power for Mann-Whitney *U* tests to detect moderate-sized effects (CLES ~ 0.64). Data analysis was conducted in R version 4.5.0 (R Core Team, 2025) and contributed packages (Barrett et al., 2025; Ben-Shachar, Lüdtke, & Makowski, 2020; Edwards, 2025; Müller, 2020; Wickham, 2016).

Ethics

The Monash University Human Research Ethics Committee granted ethics approval for this project (Projects 42851 and 43444). All participants provided informed consent.

RESULTS

Sample characteristics

Descriptive statistics are reported in Table 1 and Supplementary Table S2. Groups were matched on age and gender by design, and incidentally matched on subjective SES, employment, education, and self-reported masculinity and femininity. In both groups, sports or race betting was

Table 1. Characteristics of matched samples

Measure	Mean scale score		Teststatistic	<i>p</i>
	PGSI 0–4	PGSI 5+		
Age ¹ mean	34.44	32.22	<i>U</i> = 3955	.226
Gender ¹ % man or male	71.43	70.59	$\chi^2 = 0.01$.904
PGSI ¹ mean	1.70	12.11	–	–
Masculinity ² mean (scale range: 1–7)	4.21	4.36	<i>U</i> = 3492	.801
Femininity ² mean (scale range: 1–7)	3.21	3.22	<i>U</i> = 3526	.889
Subjective SES ¹ mean (scale range: 1–10)	5.96	6.02	<i>U</i> = 3378	.531
Education ¹ % university educated	70.24	64.71	$\chi^2 = 0.59$.443
Employment ² % full time	73.81	70.59	$\chi^2 = 0.22$.640
Race/sports betting frequency ¹ % weekly or more	25.00	63.53	$\chi^2 = 25.41$	< .001
Overall gambling frequency ² mean days per month	5.36	10.40	<i>U</i> = 1981	< .001
Frequency of sports and race betting ² mean days per month	4.24	8.33	<i>U</i> = 2235	< .001
Most frequent gambling activity ² % sports/race betting	69.05	57.65	$\chi^2 = 2.36$.124
Most frequent betting mode ² % online	88.10	81.18	$\chi^2 = 1.55$.213
Frequency of impulsive betting ² % often or always	16.67	32.94	$\chi^2 = 5.99$.014
Number of accounts ^{2,†} mean	1.83	2.64	<i>U</i> = 2829	.026

Table notes: For brevity descriptive statistics were computed on dichotomised variables, see supplementary materials for more detailed descriptives.

1 = Information collected during Phase One screening survey; 2 = Phase Two.

† = 2 outliers excluded. Statistical significance dependent on removal of these cases. See supplement.

U = Mann Whitney *U*-test (Wilcoxon rank sum test);

χ^2 = Pearson's chi-squared test.

the most frequent gambling activity for most participants, and both groups indicated a comparable preference for online wagering.

As expected, groups differed in gambling intensity and impact: the higher-risk group reported gambling more frequently, more active betting accounts (after excluding outliers), and placing impulsive bets more frequently.

Primary outcome measures

Product features. The higher-risk group reported more frequent use of both in-play betting and instant cash-out. There were no significant differences between groups in the frequency of use of multi bets, proposition bets, or social betting features. The higher-risk group were also significantly more likely to watch live-streamed matches within a betting app, but reported comparable rates of watching the events they bet on more generally. Results are displayed in Table 2.

Betting circumstances. Participants in the higher-risk group were more likely to report that betting prevented them from getting enough sleep. Both groups reported comparable frequencies of betting under the influence of alcohol, and betting socially with friends or family. Results are displayed in Table 2.

Marketing offers. Most participants (87.6%) reported receiving a matched-deposit offer in the past year, at comparable rates across groups (lower-risk = 86.9%, higher-risk = 88.2%; $\chi^2(1, N = 169) = 0.07, p = .793$). People in the higher-risk group reported being more likely to make an immediate deposit to qualify for these offers ($M = 3.05$), relative to the lower-risk group ($M = 2.47$), $U = 1940.50, p = .002, CLES = .65 [.56, .73]$.

Most participants (87.6%) reported using bonus funds to place a bet in the past year. Again, comparable rates were observed across groups (lower-risk = 84.5%, higher-risk = 90.6%; $\chi^2(1, N = 169) = 1.43, p = .232$). Overall, more than half of participants (57.4%, 95% bootstrapped CI = [49.3, 65.5]) reported being more likely to place longshot bets when using bonus funds, relative to betting with their own money (a Wilcoxon signed-rank test indicated a tendency to respond above the scale midpoint, $W = 4360.0, p < .001$; see Supplementary Figure S4). This tendency was observed in both the higher-risk ($M = 3.55$) and lower-risk ($M = 3.58$) groups, and groups did not differ significantly ($U = 2784, p = 0.840$).

DISCUSSION

This study used a cross-sectional case-control design to investigate whether specific features of betting platforms were used more frequently by people at a greater risk of gambling harm, relative to a demographically matched lower-risk control group who also gambled at least monthly. We focused on features of interactive sports-betting products that are thought confer a risk of harm by facilitating

Table 2. Main results

Measure	Mean scale score		U	p	CLES [95% CI]
	PGSI 0–4	PGSI 5+			
<i>Product features</i>					
In-play betting	1.69	2.21	2529.0	< .001	.65 [.56, .72]
Cash out	2.10	2.54	2695.0	.004	.62 [.54, .70]
Multi bets	3.12	3.08	3590.5	.948	–
Proposition bets	2.23	2.16	3697.0	.678	–
Social betting	1.89	1.93	3414.0	.599	–
Streaming sports events in-app	2.25	2.88	2539.5	< .001	.64 [.56, .72]
<i>Betting circumstances</i>					
Watch events you bet on	3.81	4.00	3125.5	.137	–
Sleep disturbance (because of betting)	1.29	2.17	1861.0	< .001	.74 [.66, .80]
Betting with friends of family	2.77	2.67	3681.0	.720	–
Betting while affected by alcohol	2.13	2.39	2981.5	.093	–

Table notes: Participants were provided with 5 response options: “Never”, “Rarely”, “Sometimes”, “Often”, and “Always” (scored 1 – 5 respectively). All items refer to frequency in the last 12 months. One participant in each group did not respond to the *betting while affected by alcohol* question, and one participant in the PGSI 5+ group did not respond to the *sleep disturbance* item. Complete case analysis was used in each case. The [supplementary materials](#) include percentage frequency plots for each response option in each PGSI risk group for these measures.

a continual and cyclical pattern of gambling engagement (the *Sports Betting Loop*; Parke & Parke, 2019).

Consistent with this theory, and with previous findings, the higher-risk group reported more frequent use of in-play betting (Gainsbury et al., 2020; Hing et al., 2016; Vieira et al., 2023) and instant cash-out (Lopez-Gonzalez et al., 2019; Sinclair et al., 2024). The higher-risk group also reported a greater frequency of sleep delays or disturbances attributable to betting—as has been reported with addictive or excessive technology use more broadly (Alimoradi et al., 2019; Kristensen, Pallesen, King, Hysing, & Erevik, 2021; Kumar, Katoch, Kumar, & Sehgal, 2025). Higher gambling risk was also associated with a greater tendency to make an immediate deposit in response to a matched-deposit offer, which suggests that this marketing strategy could act as a potent environmental cue to re-initiate gambling. This is especially concerning given that participants also reported a tendency to make riskier bets with promotional funds, consistent with past findings (Hing et al., 2019; Rockloff, Browne, Russell, Hing, & Greer, 2019).

A novel and noteworthy finding was that using a betting app to stream live events was more common among those at higher risk. We reasoned that this feature could encourage a pattern of cyclical and continuous betting because watching a live-streamed event using a betting app motivates sustained attention on the betting platform and maintains user engagement between episodes of active betting. Once attention is held, live-streamed events then provide further opportunities for integrated marketing. Moreover, by keeping the app open and active, this feature reduces the number of actions required to place a bet, particularly because access to live streams often requires the customer to have money in their account or to have placed a recent bet (e.g., Sportsbet, 2025).

We hypothesised that multi bets and proposition bets would be associated with gambling risk because both

products can facilitate continuous betting. In-play proposition bets allow bets on events that are settled shortly after it is placed, thereby accelerating the pace of betting (i.e. ‘micro’ bets, Parke & Parke, 2019; Russell et al., 2019). Similarly, multi bets may prompt repeated engagement with an app following each successful leg. Both products also allow bets at long odds that may appeal to those trying to win back losses, while typically carrying a larger house-edge that may increase spending and financial harm (Newall et al., 2021). Contrary to these predictions, we did not observe more frequent use of either product among the higher-risk group. However, the null result for proposition bets may be an artefact of our survey wording. Although accompanied by a definition of a proposition bet, the item listed ‘micro’ and ‘exotic’ bets as synonyms. Proposition bets can involve events that are settled quickly (i.e., ‘micro’ bets), but can also involve extended periods (e.g., an entire season). So, while micro bets are short-duration proposition bets, the terms are not interchangeable. Further, while ‘exotic’ often refers to proposition bets in a sports betting context, in racing it typically refers to bets that involve multiple places (e.g., exactas, or trifectas).

Although this study accounted for potential confounding by age and gender, alternative confounding pathways could explain our results. For example, individual differences in novelty-seeking may contribute to both gambling risk and the adoption of new product features (Hing, Rockloff, & Browne, 2023). Likewise, people who are at-risk from gambling may report more frequent use of a feature simply because their high-frequency betting has afforded them more opportunities to explore different features of an app. Our results should also be viewed in light of limitations in our study design. These include the use of retrospective self-report measures that may be subject to recall or social desirability biases. The modest sample size means the study was not powered to detect smaller group differences that may

still be relevant for harm prevention. Finally, the use of a non-probability sampling method and recruitment via Prolific, which has a relatively small Australian user base, may have limited the representativeness of the sample. Larger and more representative studies will help to confirm the generality of any novel results.

In summary, our findings were broadly consistent with Parke and Parke's "Online Sports Betting Loop". This theory offers a coherent organising framework for theorising about the risks associated with gambling product design. Our results confirmed the novel prediction, extrapolated from this theory, that in-app streaming of live events may contribute to gambling harm. We also replicated previous reports of positive associations between risky or harmful betting and the use of live betting products and marketing offers.

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Hugh Farrell has no further financial interests to declare.

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Authors' contribution: HF: conceptualization; data curation; formal analysis; investigation; methodology; project administration; writing – original draft; writing – review & editing. DB: conceptualization; data curation; formal analysis; funding acquisition; investigation; methodology; project administration; resources; software; supervision; writing – original draft; writing – review & editing. DM: conceptualization; data curation; formal analysis; methodology; software; supervision; validation; visualization; writing – original

draft; writing – review & editing. All authors contributed directly to writing the manuscript. All authors had full access to all data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

Conflict of interest: The authors declare that they have no conflict of interest in relation to the publication of this article.

SUPPLEMENTARY DATA

Supplementary data to this article can be found online at <https://doi.org/10.1556/2006.2025.00491>.

LIST OF ABBREVIATIONS

AUD	Australian Dollars
CLES	Common language effect size
PGSI	Problem Gambling Severity Index
SES	Socioeconomic status

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