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Use and impact of government-mandated activity statements for online gambling in Australia

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Abstract

Background Since July 2022, the Australian government has required online wagering operators to send all active customers activity statements as part of the National Consumer Protection Framework in an effort to reduce gambling harms. Having access to clear and accurate gambling expenditure data is intended to facilitate awareness and reflection and enhance consumer self-awareness for their spending, which can consequently enable informed and considered decisions regarding future gambling spend. This study aimed to explore Australian wagering customers' use of activity statements and their impact on gambling behaviour.

Methods Data was gathered through surveys distributed via two online gambling operators to assess problem gambling severity, self-reported use and impact of activity statements, and ability to recall gambling spend. The operators provided matched customer account data for each participant, which was de-identified but enabled gambling behaviour to be objectively assessed and the accuracy of self-reported spending to be determined. The final sample comprised 1647 participants (85% male) with a mean age of 44 years.

Results Our results suggest that 57.2% of participants opened their statements at least "sometimes", indicating consumer interest in activity statements. Of the customers who opened statements, 17.6% reported that the statements decreased their gambling, and a very small proportion (0.8%) reported a subsequent increase in their gambling. There was some evidence of a dose-dependent relationship whereby the more people engaged with statements, the more effective they were perceived to be. Reading statements more often and more recently was not associated with improved recall of recent gambling spend or net outcome. There were no significant changes in gambling behaviour (betting frequency and deposit amount) observed around the time when statements were sent.

Conclusions A notable proportion of online wagering customers are using activity statements and many feel these are useful in tracking their gambling spending and may help them to reduce their gambling. Importantly, there was minimal evidence of negative unintended consequences observed in self-report and objective behavioural data. Efforts to enhance engagement with activity statements would likely result in further benefits. These findings contribute to the evaluation of a national policy regarding consumer protection tools designed to reduce gambling harm.

Keywords Self-referential feedback, Responsible gambling, Harm-minimisation, Consumer protection, Transaction statement

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Introduction

Gambling is widely legal and available across international jurisdictions and legislated as an entertainment activity. Nonetheless, it is broadly acknowledged that this activity has inherent risks and gambling harms impact

individuals and those around them, including the development of gambling disorder. Regulators are increasingly focused on ways to reduce gambling harms and one of the core components of these attempts focuses on ensuring that customers have access to accurate information about how the products work and outcomes are determined. Informed choice refers to the ability of an individual to decide whether and how to gamble based on accurate information, free from coercion [1]. Informed choice is considered a fundamental right in many circumstances broadly beyond the gambling field.

Efforts to enhance player understanding have historically focused on developing standardised educational materials. Despite substantial work in this area, there is limited evidence that education-based strategies are effective in influencing gambling behaviour [2–4]. Behavioural science principles hold that individuals are more likely to change their behaviours in response to information that is perceived to be relevant to them [5]. Personalised feedback and information which prompts self-reflection thus represents an important direction for harm-minimisation approaches [6]. Customers having access to an accurate summary of their gambling spend is important as there is evidence that gambling customers have very poor recall and self-reported accuracy in relation to their gambling spend [6, 7]. This is consistent with a cognitive theoretical model of gambling problems which holds that individuals are biased towards recalling wins to a greater extent than losses [8, 9]. Having access to accurate data to enable gambling customers to keep track of their gambling expenditure may facilitate awareness and reflection on their level of spending. This could enable informed and considered decisions regarding future gambling spend leading to sustainable gambling behaviours and a reduction in risk of gambling harms.

Personalised feedback on gambling behaviour has been shown to impact gambling behaviour in terms of reduced risky engagement. Trials of personalised feedback for online gambling behaviour demonstrated customers who received this moderated their gambling through gambling less, spending less time, and losing less money compared to those who have not received feedback [10, 11]. In a study of casino gambling, following the receipt of personalised behavioural feedback of the actual amount of money won or lost in the previous 3 months, almost all participants reported an intention to maintain or reduce their gambling expenditures [12]. Players who indicated an intention to reduce their gambling visited the casino less, decreased their wagering, and decreased their losses in the subsequent 3 months. Individuals classified as being at moderate or high-risk for gambling problems who reported losing more than they thought expressed the greatest intention to reduce their gambling, although no moderation was observed in the behavioural data based on problem gambling severity. The downregulation of gambling behaviour following exposure to discrepancy in their perceived and actual gambling losses was seen despite a lack of perceived impact of the information. These results support the cognitive theory of gambling whereby individuals continue to gamble beyond levels of affordability because they do not accurately estimate the amount of money they have won or lost gambling [13, 14]. However, the results are limited in terms of lack of representation (only loyalty-members were surveyed) and attrition throughout the study; only 31% of the original respondents were retained at the second time point and the behavioural data of non-respondents was not measured.

Technology is increasingly integrated into gambling, including the use of player accounts, where operators are subsequently able to track individual expenditure and behaviour [15]. Providing customers with information on their own play is consistent with the fair and transparent provision of a consumer product [16]. Only operators who enable account-based gambling can provide transaction statements. These are typically spreadsheet-style lists of transactions without an easily comprehensible summary, clear net outcome, or comparisons over periods of time (e.g., this month vs last month). Perceived usefulness of transaction statements is important given that these are generally implemented in a voluntary manner which requires consumers to activity engage with these. Preliminary research within land-based venues indicates transaction history statements are viewed favourably among regular gambling customers [17–19]. Similarly, research with UK gambling consumers found favourable attitudes towards statements with a clear net summary (hereafter termed "activity statements"). However, a survey of online wagering customers in Australia in 2017 found low voluntary engagement with transaction statements; one-quarter of respondents stated that they had viewed these, and less than one in ten had used them [20].

A 2018 survey of Australian online wagering customers found that of the 468 users of transaction statements, 71% were satisfied with them and 23% reported that their gambling had changed because of the statements, mostly towards less risky behaviours [16]. There is some evidence of greater use of transaction statements among those classified as experiencing gambling problems than those classified as not experiencing gambling problems [17, 18], which is consistent with findings of greater self-reported intent to change gambling behaviour following provision of accurate information about gambling losses [12].

A UK study examined the impact of activity statements with different formats (all showing summaries of expenditure) were viewed by participants during a simulated gambling session [21]. Seeing any activity statement resulted in lower bet amounts, lower average stakes, and improved recall of the outcome, particularly among those who had lost. There was some evidence that activity statements were most effective in reducing bet size among those at moderate risk of experiencing gambling problems. However, no behavioural evidence has been found to indicate whether activity statements have any differential impact based on problem gambling severity.

One potential concern related to the provision of activity statements is that this information may be shocking and potentially distressing for gambling customers, or that it may lead to individuals chasing their losses when they are confronted with them. This is consistent with research on the ostrich effect, whereby individuals avoid negative information or feedback and the avoidance is driven by delaying receiving information that is confronting and disappointing [22, 23]. Conversely, if individuals perceive their gambling to be 'safe', they may increase their gambling. This aligns with the Canadian casino study which found that, those who over-estimated their losses when initially asked (i.e., those who lost less than they thought) increased the amount they wagered and the amount they lost in the subsequent 3 months [12]. Due to the lack of research on the provision of activity statements, there is limited evidence to determine whether such unintended negative consequences occur.

Previous research on the impact of activity statements is limited with few studies combining both self-report and behavioural data for a large, representative sample of regular gambling customers. Previous experimental trials have been conducted in simulated gambling settings or have been unable to track behaviour across all customers. Participants who agree to engage in experimental research are unlikely to be representative of the larger population of online wagering customers, and small samples make it difficult to examine differences between population subgroups. Studies which have only looked at behavioural account data are unable to ascertain the differential impact of activity statements or personalised feedback based on risk level or other personal factors. Consequently, the impact of activity statements that include a clear net summary on gambling behaviour and decision-making, particularly in the wider population of online gambling consumers remains uncertain. The current study will extend previous work by examining the impact of activity statements with a clear net summary of gambling outcomes on customer's behaviour based on self-reported impact as well as objective behavioural data and ability to accurately estimate past gambling.

As of mid-2022, the Australian government requires online wagering operators to send all active customers activity statements as part of a national overhaul of online wagering regulations to reduce gambling harms [24]. These are emailed monthly to all customers with account activity in the preceding month. The legislation requires that customers are not required to log-in to their wagering accounts to access the statements. As such, it is not possible for operators to track whether customers open and engage with the statements that are pushed to all active customers each month. The Australian government commissioned the Behavioural Economics Team of the Australian Government to design easy-to-understand activity statements for online wagering clients [25]. An experimental trial of the activity statements within a simulated gambling task showed that participants reduced their betting after seeing an activity statement as compared to those who did not see a statement. This effect was greater for individuals experiencing moderate gambling problems, those with poor financial literacy, participants with a tendency to chase losses, and those who hold false beliefs about the probability of winning; however, as it was based on simulated gambling it cannot be assumed that the results will translate into actual gambling. Currently, all operators are required to loosely follow the same format to enable consistency across the industry for consumers (who will receive a separate statement from each operator that they bet with). The aim of the present study was to explore wagering customers' use of these activity statements and the impact of the statements on gambling behaviour.

Methods

This study's methods, including recruitment strategy, participant eligibility, and variables collected were pre-registered on Open Science Framework (https://osf.io/vdsmw). The study was exploratory in nature given the lack of prior research on the use of and impact of activity statements, consequently no hypotheses or analysis plans were pre-registered.

Design and participants

Customers from two online wagering (i.e., sports and race betting) sites were invited to complete a survey about their gambling. Australian laws only permit wagering and lotteries to be provided by licensed operators (i.e., all other forms of online gambling are not legal). The two wagering sites involved in this study are licensed in Australia and managed by the same international parent company and have an estimated 16% of the local market share, making them the third largest online wagering operator. The selection and recruitment of eligible customers involved several steps. First, to be eligible,

customers had to have placed at least one bet with the site in the preceding 6 months, have held an account for at least 30 days, and not have a suspended account, be self-excluded, or on a timeout/take-a-break. Second, as we planned to evaluate the sites' risk detection system, the operator identified all customers that the system had flagged in the 6 months prior who met the eligibility criteria. Third, we requested the operator randomly select a sample from the remaining "not-at-risk" customers at a ratio of 20:80 *at-risk/not-at-risk*. As a result of this process, 4,829 eligible "at-risk" customers and 20,000 randomly selected "not-at-risk" customers (rounding up) were invited to the survey. In our preregistration, we stated that we aimed to achieve a minimum of 1500 completed surveys (defined as completion of all PGSI items).[1]

Procedure and measures

We received a list of the unique customer identifiers for all 24,879 eligible customers in January 2024 and used these to generate unique survey invitation links via Qualtrics, where we hosted the survey. These links were returned to the operator who sent recruitment messages within 48 h of identifying the eligible sample. Customers first received an email survey invitation followed by a SMS reminder 8 days later.

All customers who started the survey read a study information sheet and consented to participate. Those who completed the survey could enter a prize draw to win one of 20 e-gift vouchers valued at $250 which could not be redeemed for cash or be spent on gambling. Ethics approval was obtained from the University of Sydney Human Ethics Committee [ID: 2023/029]. The survey contained various measures of gambling behaviour; demographic characteristics; the Problem Gambling Severity Index (PGSI) [26], a validated measure with nine-items related to gambling behaviour and related impacts answered on a Likert scale (from *not at all* to *almost always*) with the total score able to differentiate participant's between risk categories for problematic gambling; self-reported use and impact of activity statements; and asked participants to estimate their gambling spend and net outcome over the past 30-days.

Account data was requested for all 24,829 customers for 6 months before recruitment and was linked to survey responses. This data included all bets and transactions made in the 6 months before participation, as well as the past 2 years of consumer protection tool use. The operator had no access to survey responses. Our preregistration contains detailed descriptions of the sample identification process, recruitment, the invitation email, all measures included in the survey, and the data collected from the sites (https://osf.io/vdsmw).

Data analysis

We used the statistical programming language R [27] for all data analysis. Our analysis strategy and outcomes are grouped into two sections. In the first, we used survey data to understand the self-reported use and impact of statements. In the second, we employed behavioural account data to explore trends in gambling behaviour over time and in response to activity statements. As we performed multiple statistical analyses, we set our alpha level at 0.005 to reduce the Type-I error rate.

Self-reported use and impact of statements

As "at risk" customers flagged by the operator's risk detection system were oversampled (i.e., 100% of this population was invited to the survey), we used inverse probability weighting to adjust for their overrepresentation in the sample. We determined the proportions of all eligible "not at risk" customers from each operator invited to the survey. The reciprocals of these values were used to weight this population in our sample and make outcomes representative of the operators' entire customer base.[2] We used the `survey` R package [28] to compute weighted summary figures and regression models. We briefly described the statistical approaches used in our Results section and have provided extensive detail in our "Analysis document" which outlines all analytical steps taken alongside analysis code and outputs (see https://robheirene.quarto.pub/analysis-of-activity-statement-data/).

There was an error in our survey flow such that participants who responded "Always" to the question asking how often they read statements did not receive the subsequent question asking how they thought statements had impacted their gambling. As a result, 351 participants (representing 20.3% of weighted responses to the question) are not represented in outcomes relating to the self-reported impact of statements but are included in all other outcomes.

Impact of statements on trends in behavioural data

To explore trends in gambling behaviour over time and in response to statements being delivered to customers, we used Interrupted Time Series (ITS) analyses. ITS is commonly used to study the impact of interventions and

[1] This was not based on a power analysis. We aimed to recruit a relatively large sample that would be sufficiently powered to detect our minimal effect sizes of interest when investigating several research questions and hypotheses using the data.

[2] We adjusted for differences in response rates between "at risk" and "not at risk" samples before weighting both groups' data.

policies in health settings as it offers a robust method for naturalistic, observational study designs wherein randomisation and control groups are not feasible [29]. In this context, ITS allowed us to understand immediate changes in the *level* and trend (or *slope*) of gambling behaviours following the dates statements were sent to customers (i.e., *interruptions*).

The gambling company provided the specific dates when activity statements were sent to customers across months available in the behavioural account data. Statements were typically delivered within the first week of each month and to all customers at the same time. To mitigate the influence of potential anomalies associated with any single statement, we examined the impact of four statement deliveries in 2023: September, October, November, and December. We first isolated a sample from all 24,829 customers invited to the survey who had placed at least one bet in each of the 4 months preceding the delivery dates of interest (i.e., all customers who had placed at least one bet in August, September, October, & November 2023). This ensured every customer in the sample would have received an activity statement on the statement delivery dates studied. Because of this subsampling, we did not weight ITS analyses by risk status and note that outcomes from them will relate only to regular, potentially higher-risk customers.

We performed two ITS analyses, one for the number of bets placed and one for the amount of money deposited into customers' accounts. We followed best-practice guidelines in conducting and reporting our ITS analyses [30, 31]. For example, outcome variables were collapsed into a daily time level, using the median for each day as raw values were highly right-skewed. To account for heteroscedasticity and autocorrelation, we used segmented linear regression models with a generalised least square statistical method. We controlled for three time-dependent factors likely to impact our outcome variables: weekends, paydays[3] [32], and a major Australian horse racing event known as the Melbourne Cup (held in November, 2023). To our knowledge, no other major policy- or gambling-related events occurred during the timeframe studied that could have substantially influenced the outcome variables. For both models, we analysed data spanning from 2 weeks before the first statement to 2 weeks after the last statement. This ensured more than the recommended minimum of 12 time points for each period (i.e., pre-/post-interruption) was achieved [30] and represents a logical timeframe to consider changes in behaviour around statements. Finally, we conducted sensitivity analyses by adding a one- and two-day lag to identify any delayed effects of statements on behaviour and repeated the models with a subsample that included only customers with a moderate- to high-risk PGSI status.

[3] In Australia, government statistics indicate that 85% of the population receive payments on a weekly or fortnightly basis, and the most common days for these payments are Wednesday and Thursday [32]. Thus, these days were dummy coded and included as a covariate in ITS analyses. However, we note that we were unable to provide figures that confirm the proportion of people paid on these specific days.

Table 1 Sample characteristics ($N = 1647$)

Gender	
Female	13.79%
Male	84.62%
Unknown*	1.59%
Age	44.06 (15.5)
PGSI total score	3.64 (4.12)
Education[#]	
Year 11 or below (includes certificate I/II/n)	16.95%
Year 12	24.07%
Certificate III/IV	19.23%
Graduate diploma or graduate-level certificate	8.47%
Advanced diploma/diploma	9.05%
Bachelor's degree	17.85%
Master's degree	4.05%
Doctoral degree	0.33%
Past 30-day betting intensity[†]	7.87 (15.54)
Past 30-day net outcome	− 181.01 (1,226.21)
Past 30-day deposit frequency	9.41 (28.48)
Active deposit limit	
No	90.45%
Yes	9.55%

Values presented: continuous variables: mean (SD); categorical variables: percent of sample

*Gender not reported to operator

[#] Ordered from lower to higher levels of education

[†] Bets per active betting day

Results

Self-reported use and impact of statements

Of the 24,829 people invited to the survey 1959 completed the survey up to the PGSI (our predefined completion point). We identified and removed (as per our preregistration) three people who did not place a bet in the preceding 6 months and 309 who did not pass one or both attention checks. This resulted in a final sample of 1647 individuals representing 6.63% of those invited (see Table 1 for sample characteristics based on self-reported survey responses [PGSI, Education] and account data [gender, age, bets, outcomes, deposits, deposit limits]).

Who uses activity statements?

In response to a question asking about how frequently participants open the statements they receive, 23.1%

of participants selected "Never", 19.8% "Rarely", 23.6% "Sometimes", 13.3% "Very Often", and 20.3% "Always". We used an ordinal regression model to identify predictors of activity statement use (see Table 2). Being female and having a high-risk PGSI score were associated with reduced statement use. Having an unknown gender (i.e., not reported to the operator) was associated with increased use.

Table 2 Ordinal regression: predictors of statement use frequency

N **= 1213**

	log(OR)	OR	95% CI	*p* value
Age	0.003	1.00	0.99, 1.01	0.543
Gender				**0.005**
Male	–	–	–	
Female	– 0.446	0.64	0.45, 0.91	
Unknown*	1.125	3.08	1.06, 8.92	
Education level	0.021	1.02	0.96, 1.09	0.517
PGSI category				**0.003**
No risk	–	–	–	
Low risk	0.176	1.19	0.85, 1.67	
Moderate risk	0.193	1.21	0.88, 1.68	
High risk	– 0.407	0.67	0.45, 0.98	
Past 30-day betting intensity	0.001	1.00	0.99, 1.01	0.873
Past 30-day net outcome	0.000	1.00	1.00, 1.00	0.581
Past 30-day total no. deposits	0.001	1.00	1.00, 1.01	0.588
Active deposit limit				0.057
No	–	–	–	
Yes	0.376	1.46	0.99, 2.14	

Emboldened *p* values were statistically significant at < 0.005

OR, odds ratio; CI, confidence Interval

*Gender not reported to operator

Perceived impact of activity statements as a harm-reduction strategy

When participants were asked to rate how useful activity statements were to them in tracking their spending, 36.1% responded "Not important", 15.5% "Slightly important", 16.8% "Moderately important", 20.8% "Important", and 10.9% "Very important". When ranked by the relative proportion of positive responses, activity statements were viewed as the third most useful tracking tool among a list of eight, and the top among formal tools (see Fig. 1).

When asked whether reading activity statements resulted in any change in their gambling behaviour, among the customers who indicated that they had opened the statements, 0.3% of participants stated that it "Greatly increased my gambling", 0.5% said it "Increased my gambling", 81.6% said there was "No change in my gambling", 15.4% said it "Decreased my gambling", and 2.2% said it "Greatly decreased my gambling" (participants who stated they never read statements were removed from these calculations). The ratio of people who said they decreased their gambling because of reading statements relative to those who said they increased their gambling because of them was 22.2:1. More at-risk consumers, as defined by PGSI grouping, were more likely to report benefitting from statements (see Fig. 2).

A logistic regression was used to identify predictors of a self-reported decrease in gambling because of reading statements. Likert responses were coded such that "Decreased my gambling" and "Greatly decreased my gambling" were combined and the "No change in my gambling" response option was used as the reference value. Responses relating to increased gambling (0.8% of all responses) were removed. The outcomes from this model are presented in Table 3. Reading statements more frequently, having a moderate-high-risk PGSI score, and higher number of bets per day (betting intensity) were all

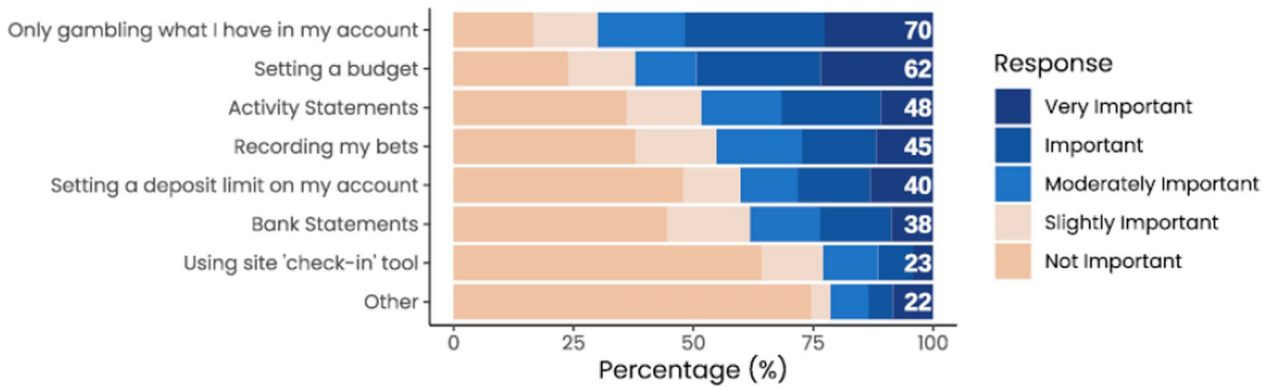

Fig. 1 Bar plots showing responses to perceived use of activity statements in tracking spend. Participants were asked the following question: "Please indicate how useful the following are in supporting you to track your gambling spending". Numeric values on the right side of bars indicate the total percentage of responses for each strategy that were "Moderately important", "Important", or "Very important"

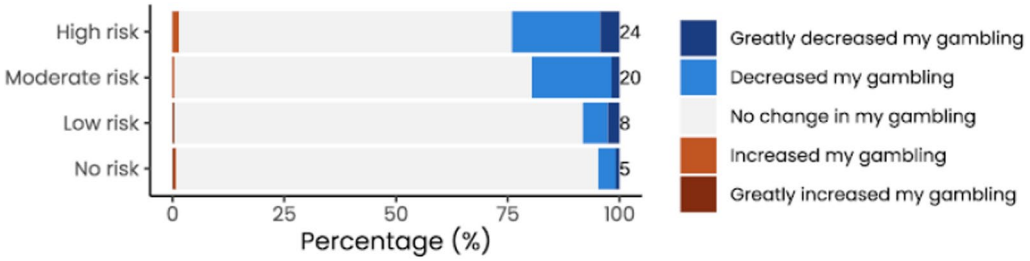

Fig. 2 Bar plots showing responses to perceived behaviour change resulting from reading statements. Participants were asked the following question: "To what extent if any did reading your activity statement result in any change in your gambling behaviour?" grouped by PGSI status (no risk: 0; low-risk: 1–2; moderate-risk: 3–7; high-risk: > 7). Numeric values on the right side of bars indicate the total percentage of responses for each group that were "Greatly decreased my gambling" or "Decreased my gambling"

Table 3 Logistic regression: predictors of self-reported reductions in gambling due to reading statements

N **= 690**				
	log(OR)	**OR**	**95% CI**	***p* value**
How frequently do you read statements?	**< 0.001**			
Rarely	–	–	–	
Sometimes	1.121	3.07	1.45, 6.47	
Very often	2.275	9.73	4.53, 20.9	
Age	– 0.030	0.97	0.95, 0.99	0.008
Gender				0.777
Male	–	–	–	
Female	– 0.339	0.71	0.25, 2.00	
Unknown	0.386	1.47	0.12, 17.7	
Education level	– 0.039	0.96	0.82, 1.12	0.620
PGSI group				**< 0.001**
No risk	–	–	–	
Low risk	0.010	1.01	0.37, 2.73	
Moderate risk	1.248	3.48	1.52, 7.99	
High risk	1.541	4.67	1.809, 12.1	
Past 30-day betting intensity	0.017	1.02	1.01, 1.03	**0.003**
Past 30-day net outcome	0.000	1.00	1.00, 1.00	0.711
Past 30-day total no. deposits	0.006	1.01	1.00, 1.02	0.227
Active deposit limit				0.591
No	–	–	–	
Yes	– 0.245	0.78	0.32, 1.92	

The outcome variable was self-reported changes in gambling behaviour as a result of reading statements, with the two response options representing reductions in gambling used as the target value and the reference value set as the response indicating no self-reported change in gambling as a result of reading statements. Emboldened *p* values were statistically significant at < 0.005

OR, odds ratio; CI, confidence Interval

associated with reporting a decrease in gambling because of reading statements (Table 3).

Linear regression models were used to determine whether reading statements frequently was associated with an improved ability to recall past 30-day gambling spend (i.e., total money wagered on all bets) and net outcome (i.e., total money won or lost). Self-reported estimates for spend and net outcome were compared with actual values computed using account data. The difference between them as a percentage of the actual value (*percentage discrepancy)* was used as the outcome variable in models. Both percentage discrepancy variables were highly right-skewed and were converted using a square root transformation. We included the number of days between each participant's survey completion and receiving their last activity statement as a predictor in the model. The number of bets made in the past 30 days was also included as a covariate to account for the impact of bet number on recall (individuals who had not placed a bet in the past 30 days were removed from these analyses).

The frequency of activity statement use and the number of days since receiving a statement were not predictive of spend or net outcome recall accuracy (see Table 4). A greater number of past 30-day bets was associated with a more accurate recall of net outcome (i.e., a decreased discrepancy between self-reported and actual values), although this effect was small and did not reach statistical significance at our reduced alpha level of 0.005.

Impact of statements on trends in behavioural data

We identified 9570 customers who placed at least one bet in each of the 4 months preceding the statement delivery dates studied and who therefore received a statement on each of these dates. Of these, 9004 made at least one deposit of money into their account during the ~ 4-month window of interest and so were included in analyses relating to deposit amount. We first plotted daily bet frequency (Fig. 3) and deposit amount (Fig. 4) values over the period studied to visually inspect trends.

Outcomes from the two ITS segmented regression models are presented in Table 5. Regression coefficients in the table for "level" terms represent immediate changes

Table 4 Impact of statement use on ability to recall recent gambling spend and net outcome

	Predictors of spend recall (*N* = 1075)			Predictors of net outcome recall (*N* = 1034)		
	Beta	**95% CI**	***p* value**	**Beta**	**95% CI**	***p* value**
Number of bets	− 0.002	− 0.004, 0.000	0.022	− 0.007	− 0.012, − 0.002	0.007
Number of days since last statement	0.262	− 0.046, 0.569	0.10	0.763	− 0.296, 1.822	0.2
How often do you read statements?						
Never	–	–		–	–	
Rarely	− 0.581	− 5.376, 4.214	0.8	3.782	− 4.318, 11.88	0.4
Sometimes	− 2.801	− 6.755, 1.152	0.2	0.451	− 5.129, 6.031	0.9
Very Often	0.300	− 5.214, 5.814	> 0.9	1.923	− 4.016, 7.863	0.5
Always	− 2.876	− 6.698, 0.946	0.14	12.67	− 9.037, 34.37	0.3

The outcome variable in both models was the discrepancy (as a percentage of the actual value) between self-reported and actual spend/net outcome. The absolute values of the net outcome percentage discrepancy were used to account for negative numbers

OR, odds ratio; CI, confidence interval

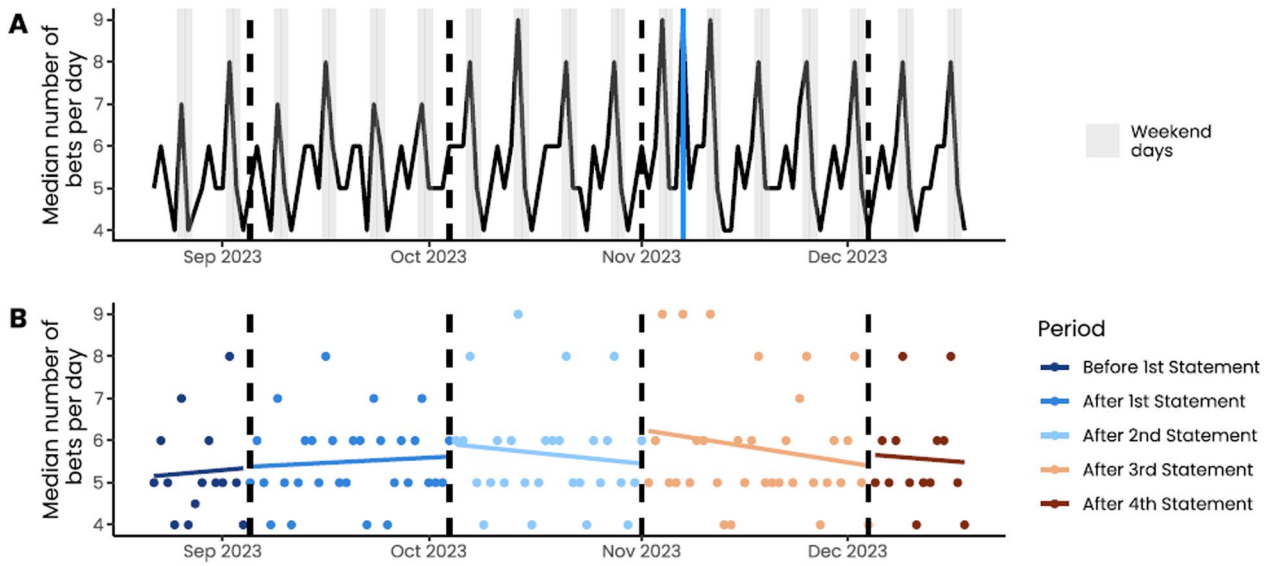

Fig. 3 Trends in the median bets per day around four activity statement delivery dates in 2023. The data points refer to bets by 9570 wagering customers. Panel **A**: Line graph showing trends in the median number of bets made per day; black dotted lines are placed at the dates each statement was sent to customers via email; grey boxes represent weekend days; the solid blue line is placed on the date of Melbourne Cup. Panel **B**: Equivalent dot plot showing the same datapoints with linear trend lines for each period pre- and post-statements

in outcomes post-statement, whereas "slope" terms represent changes in trends over time post-statement. There was no statistically significant level or slope change in daily betting frequency or deposit amounts following any of the statement dates. Weekend days, paydays, and the Melbourne Cup event were all associated with significantly increased betting frequency, and common Australian paydays were linked to significantly increased average deposit amounts.

We performed two sensitivity analyses to ensure the robustness of outcomes from our ITS analyses.[4] First, we repeated the same analyses only including customers reporting some level of gambling problems to determine whether the aggregation of all eligible customers in our original analyses masked a more pronounced impact of statements on this group. We isolated 658 people from the sample of customers used in our original ITS analyses who had completed the survey and reported a PGSI

[4] No type-1 error correction procedures were implemented during this process to maximise discovery and thus findings should be interpreted in light of the elevated risk of false-positive outcomes.

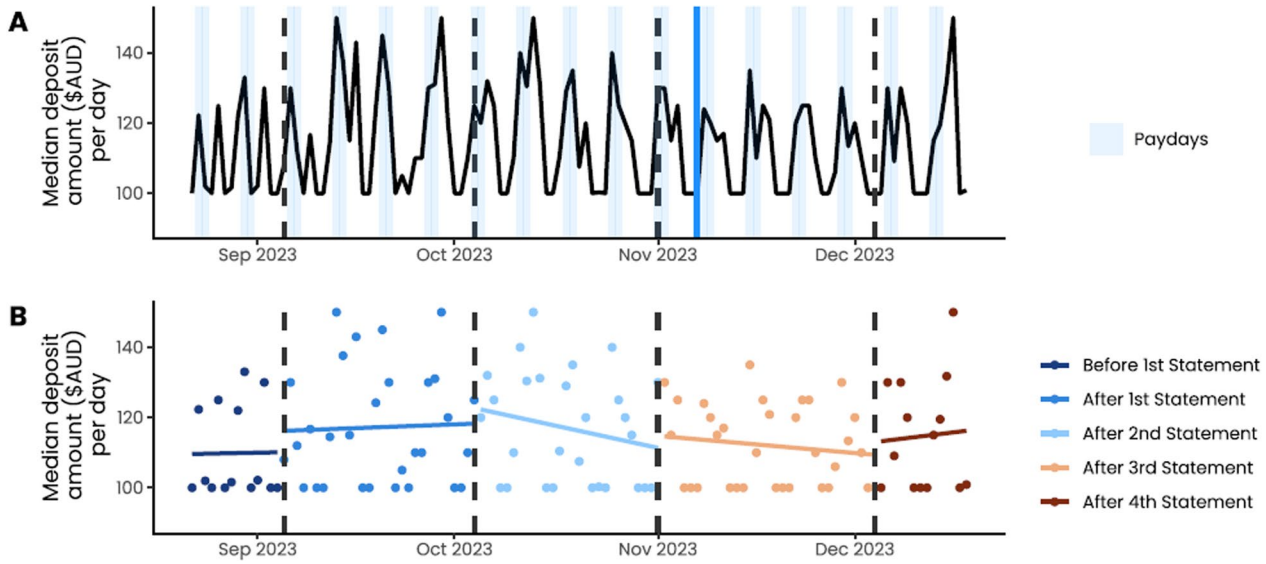

Fig. 4 Trends in the median daily deposited amount around four activity statement delivery dates in 2023. The data points refer to deposits by 9004 wagering customers. Panel **A**: Line graph showing trends in the median amount of money deposited per day with time/event markers shown; black dotted lines are placed at the dates each statement was sent to customers via email; blue boxes represent common paydays in Australia (i.e., Wednesday & Thursdays); the solid blue line is placed on the date of Melbourne Cup racing event. Panel **B**: Equivalent dot plot showing the same data points without time/event markers and with linear trend lines for each period pre- and post-statements

Table 5 Interrupted time series analysis: impact of activity statements on betting behaviour

	Median number of bets per day (*N* = 9570)			Median deposit amount per day (*N* = 9004)		
	Beta	**95% CI**	***p* value**	**Beta**	**95% CI**	***p* value**
Intercept	4.479	3.897, 5.06	0.000	100.475	89.009, 111.941	0.000
Time	0.013	− 0.063, 0.09	0.736	0.542	− 0.947, 2.03	0.477
Post-statement 1 (level)	0.020	− 0.767, 0.806	0.961	1.422	− 13.809, 16.654	0.855
Time after statement 1 (slope)	− 0.006	− 0.084, 0.073	0.890	− 0.391	− 1.943, 1.16	0.622
Post-statement 2 (level)	0.204	− 0.379, 0.788	0.494	1.748	− 9.989, 13.485	0.771
Time after statement 2 (slope)	− 0.022	− 0.056, 0.012	0.217	− 0.502	− 1.201, 0.196	0.161
Post-statement 3 (level)	0.299	− 0.293, 0.891	0.324	3.499	− 8.204, 15.202	0.559
Time after statement 3 (slope)	0.009	− 0.023, 0.041	0.592	0.205	− 0.445, 0.855	0.538
Post-statement 4 (level)	− 0.093	− 0.751, 0.565	0.782	− 1.992	− 15.243, 11.26	0.769
Time after statement 4 (slope)	0.015	− 0.057, 0.087	0.687	0.945	− 0.449, 2.34	0.187
Weekend days	1.659	1.383, 1.935	**0.000**	2.352	− 2.758, 7.461	0.369
Pay days	0.908	0.608, 1.207	**0.000**	17.921	12.479, 23.363	**0.000**
Melbourne Cup	3.617	2.193, 5.042	**0.000**	− 10.424	− 36.059, 15.21	0.427

Emboldened *p* values were statistically significant at < 0.005

OR, odds ratio; CI, confidence interval

score in the moderate- to high-risk range (i.e., scores > 2). We repeated both ITS analyses using the same procedures and found almost identical results. There was a statistically significant level change in bets per day following statement 3 delivered in November 2023 (*Beta* = − 1.860 [95% CIs − 2.23, − 0.489], *p* = 0.009), representing an acute reduction in betting frequency in this group. Additionally, there was a negative slope change in daily deposit amount following statement 2 in October (*Beta* = − 1.561 [95% CIs − 2.752, − 0.371], *p* = 0.012), representing a downward trend in depositing amounts following the statement. Finally, there was a positive slope change in deposit amount following statement 3 (*Beta* = 1.793 [95% CIs: − 0.680, 2.905], *p* = 0.002), representing a reversing of the trend following statement 2 (see Table 6 in our online Analysis Document for the full

model outcomes: https://robheirene.quarto.pub/analysis-of-activity-statement-data/).

In the second set of sensitivity analysis, we added one or two days to statement dates to account for potential lag effects whereby the impact of statements is not realised on the day they are delivered to customers. For both bets per day and amount deposited, adding a one-day or 2-day lag in the interruption for statement dates did not affect any of the outcomes in terms of statistical significance of notable changes in regression coefficients from the original models (see Table 7 in our online Analysis Document for the full model outcomes).

Discussion

This study represents the first evaluation to our knowledge of the use and impact of activity statements recently mandated by the Australian Commonwealth Government for online wagering operators. Our self-report survey indicated that more than half of the survey participants opened their statements at least "sometimes" (57.2%), indicating interest among some customers with room for improving engagement. Active online wagering customers are likely to receive multiple marketing emails per week from each wagering operator with which they have an account. Statements are competing with content from operators but are somewhat successful in reaching some online wagering customers. This indicates that the mode of delivery is appropriate to communicate with customers, although additional options such as SMS could be explored. Almost two-thirds of participants (63.9%) reported that activity statements were at least "slightly important" to assist them in tracking their spend, suggesting these are perceived as useful by a substantial proportion of wagering customers. Despite positive indications, the results show that there are a notable proportion of customers not engaging with activity statements, suggesting that further efforts are needed to enhance the perceived benefits of them.

In terms of impact, from a self-report perspective, almost one-fifth (17.6%) of customers reported that the statements decreased their gambling, and a very small proportion (0.8%) reported a subsequent increase in their gambling. Reading statements more frequently was a unique predictive factor associated with a reported decrease in gambling because of the statements, providing some evidence of a dose-dependent relationship whereby the more people engage with statements, the more effective they are. However, the current study was not causal, and it is also possible that those trying to decrease their gambling will read statements more often. Nonetheless, the ratio of people who reported decreasing versus increasing their gambling as a result of statements was 22:1.2, with less than 1% of participants reporting increased gambling. Overall, this study provides preliminary evidence that online wagering customers feel that activity statements are useful in tracking their gambling spend and there is minimal evidence of negative unintended consequences.

Mandatory activity statements are part of the Australian National Consumer Protection Framework and are intended to reduce gambling harms. However, engagement with activity statements was lower among participants with greater self-reported problem gambling severity. This differs from a previous Australian study of activity statements [16], although at that time customers had to seek out transaction statements rather than having summary statements pushed to them. The reduced use amongst this subgroup is consistent with research suggesting that people are likely to deny that they have a problem to themselves, and resist engaging with interventions to support changing gambling behaviours [33–35]. Findings related to gender, that is, that women were substantially less likely to use statements than men, were unexpected and further research is recommended to explore these [16, 33–35].

Despite their lower reported interest in the statements, customers classified as at greater risk for gambling problems reported being more likely to benefit from statements as compared to those in lower classifications. Self-reporting a decrease in gambling behaviour due to reading the statements was more common among those with moderate- and high-risk gambling severity scores as well as those who had a greater number of bets. Our sensitivity analyses of trends in account data around statement dates indicate that the behaviour of higher-risk customers is more likely to be impacted by statements. Overall, these results indicate that the statements are most impactful for those with some experience of gambling problems.

These findings are consistent with previous experimental tests of activity statements and research among people who gamble which found that, once someone has admitted to themselves that they had a problem and needed help, finding resources was not difficult [25, 36]. Theoretical models such as the Elaboration Likeliness Model [37] suggest that individuals will pay more attention to information relevant to them. Individuals experiencing gambling problems are likely gambling more than they intend and exceeding their planned budget. Thus, once they acknowledge this, the information in activity statements is more useful to them than those who believe that they are spending appropriate amounts and do not need to closely monitor this. This is consistent with prior research showing people with gambling problems are more likely to attempt to track their gambling spend than those without problems [38–41].

In the broader context, we found activity statements were the most important formal informational strategy used by consumers, following a key behavioural strategy of only gambling what is in their account and a cognitive strategy of setting a budget. Notably, a similar proportion of participants report recording their own bets to track their spend. Activity statements should alleviate the need for customers to do this, which suggests that the statements are not meeting all consumer needs. It is possible that as the statements are relatively new, consumers have not yet adapted to these and are using their own pre-existing tracking systems. Alternatively, there could be a lack of trust in the information in the statements, or these statements do not provide information in the most useful format or timely manner (i.e., perhaps more current, day-to-day tracking is preferred by some). One key limitation is that the mandated activity statements provide spend per operator and many online wagering customers bet with multiple operators, making the information in each statement less useful than an overall summary. More research is required to understand how to provide customers with optimal information to enable them to track their spend in a manner that informs future betting decisions.

This study has a unique advantage in that customer account data was available to match the survey responses as well as for a broader group of consumers. This enabled additional analysis to investigate the potential impact of activity statements on actual betting and related behaviours. No evidence was found to indicate that activity statements were enhancing informed choice in terms of increasing customers' ability to accurately recall their gambling spend or net outcome. This is somewhat surprising, as this information is clearly summarised in the statements, and contradicts earlier experimental findings [21]. It is possible that participants have difficulty recalling the exact amount that they spent with the operator in question, as they may be betting across multiple accounts. Thus, the accuracy of their recall could be influenced by a consumer's overall gambling, whereby they may be aware of their global gambling expenditure as opposed to expenditure specific to each operator. There was some limited evidence that individuals who placed more bets had greater accuracy of recall related to reading statements. This may suggest that these individuals monitored their outcomes more closely and carefully considered the information provided. However, the lack of impact in terms of enhanced accuracy suggests that more is needed to be done to assist customers to be aware of how much they are spending on wagering. Future research should also consider the number of accounts consumers have when making estimates of gambling expenditure.

There was no discernible evidence that receiving activity statements was related to changes in daily betting frequency or deposit amounts outside of some minor changes seen only in those with moderate-high risk PGSI scores. While a notable minority reported benefitting from statements (almost 18%), our behavioural findings did not find any evidence of behavioural change following statement dates. These findings may indicate that statements are impacting attitudes and cognitions rather than resulting in immediate and apparent behavioural change, or that self-reported change is not accurate and impacted by biases. Further, the self-reported behavioural change could have occurred before the windows of observation included in our time series analyses. These findings differ from more positive experimental results [21]; however, this is not surprising as experimental studies involve simulated gambling, and participants may be more likely to attend to statements as they are in a research study. The discrepancy demonstrates the difficulty of relying on simulated studies to inform real-world outcomes.

Importantly, no evidence was found to suggest that activity statements are having negative unintended consequences, including encouraging customers to chase losses. This is positive given that nationally representative data suggests that around 5–6% of regular Australian sports and race wagering customers are experiencing severe gambling problems and around 35% are classified as having low or moderate problems [42]. The results are consistent with a previous experimental study which found that viewing activity statements resulted in lower amounts bet [25] and did not reproduce the finding from casino patrons that viewing information about spend may lead to increased betting [12].

This study has multiple strengths; the overall design and data collection process was pre-registered, it utilised a novel method of matching self-report surveys with actual behavioural data, had a relatively large sample size, and the survey participants were largely similar to non-respondents in their demographic and gambling characteristics [43]. However, a limitation was not being able to identify those customers who opened the statements, so impacts were based on self-report and detection across a large sample using time series analyses. Although customers from two gambling sites were used, the results may not be generalisable more broadly so further investigations are required. Further, time series analyses of statement impact on objective behavioural data included only customers who were regularly betting and did not account for the overrepresentation of customers flagged by the operator's risk detection system. As such, the results from them relate mostly to more regular, potentially higher risk consumers. Lastly, we were not able to access account data for the period before activity

statements were introduced (July 2022) and were therefore unable to determine if overall trends in bets and deposits differed before their introduction.

The authors are unaware of any evaluation of activity statements funded by any Australian government department, which may have been beneficial in terms of being able to gather data from across a broader range of operators and provide more representative outcomes. Currently, most EGM operators do not provide activity statements as EGMs allow cash which is anonymous and makes it difficult to track spend. It would be useful to see if activity statements would be perceived as beneficial among EGM customers. This would require specific testing given the structural differences between betting on EGMs compared to sports and race wagering as well as the differences in the consumers who regularly engage in these activities.

Further research is recommended to examine how customers are using the activity statements to inform refinement of these to enhance their impact. Previous Australian research indicates that online wagering customers typically have multiple wagering accounts, meaning that they may receive multiple statements each month [44]. Finding methods of increasing engagement with statements could also be of value, given our finding that those who read them more were more likely to benefit from them. Future studies could also examine the best time to send activity statements and whether this information is more impactful at various times, such as before paydays when deposits seem to increase, or during gambling sessions.

Various design principles could enhance the potential impact of activity statements. Behavioural economics-based strategies would suggest reducing friction and making actions easier to increase impact of activity statements. Consideration should be given to mandating automated display of net outcomes including spend, wins and losses for all customers at key decision points, such as when they log into accounts, or before making a deposit. This is consistent with a move to ensuring individuals can access a single customer view with their entire history of betting with the operator. An additional resource would be to develop an easy way for individuals to amalgamate statements they receive from multiple operators to enable them to see a total view of their gambling spend and net outcomes. This may include automatically combining statements into a single summary and by allowing customers to take actions immediately upon viewing their statements such as including a link directly to setting a deposit limit with a pre-filled amount based on their past spend [5, 45, 46]. This would reduce friction and make it simple and easy for customers to engage with personalised information, identify limits to set, and implement these. This is consistent with the UK Behavioural Insight Team's finding that statements with a call-to-action enhanced impact within a gambling session [21]. However, caution is needed to protect individual privacy and prevent data being shared across operators.

Overall, the current study suggests that a notable proportion of online wagering customers have positive views of the mandated activity statements and that these are opened and considered important by many as a tool to assist them in tracking their gambling spend. Despite positive self-reports in terms of leading to reduced gambling, there were no changes in gambling behaviour observed around the time when statements were sent, nor increased ability to accurately recall gambling spend or net results. This does not mean that statements are not effective in terms of consumer protection but may indicate that impacts occur gradually. Importantly, no obvious negative impacts were observed based on self-report or analysis of behavioural data, suggesting that the statements are not having a detrimental impact. The current study's findings contribute to the evaluation of consumer protection tools designed to reduce gambling harm. Further research can help identify the variation of the impact of activity statements in customer sub-types to provide personalised information that can enhance gambling related decision-making and ways to enhance engagement and impact of the statements. Making it easy and frictionless for customers to access an amalgamated statement for all their gambling may enhance perceived value and impact of the statements on subsequent informed choice, decision making and gambling behaviour consistent with sustainable gambling principles.

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Author contributions
All authors conceptualised the project. RH conducted the analyses. SG drafted the initial introduction and discussion, with all authors editing subsequent drafts. RH wrote the methods and results. All authors read and approved the final manuscript.

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Availability of data and materials
Data used for this study are commercially sensitive and cannot be shared beyond the research team. Instead, all analysis code and outcomes extending beyond those presented in this manuscript are included in our Analysis Document available here: https://robheirene.quarto.pub/analysis-of-activity-statement-data/.

Declarations

Ethics approval and consent to participate

Ethics approval was obtained from the University of Sydney Human Ethics Committee [ID: 2023/029].

Consent for publication

Not applicable.

Competing interests

SG has received direct and indirect funding since 2020 through the University of Sydney from Australian Leisure and Hospitality Group Pty Ltd, Entain Australia, Sportsbet, NSW Office of Responsible Gambling, West HQ, Brain and Mind Centre, Cambridge Health Alliance, Aristocrat Leisure Limited, and ICRG. SG has received consulting funds for providing subject matter expertise for New Zealand Crown Counsel, NSW Liquor & Gaming Authority, New Zealand Gaming Machine Association, Singapore Ministry of Health, Betcloud, NZ BlueCloud, UK Behavioural Insights Team, KPMG, QBE, Coms Systems Limited, Advance Gaming (NZ) Limited, GambleAware, Star Entertainment, GREO, Senet, and Norths Collective. SG has received honorarium and/or travel costs for presentations for Cyprus National Betting Authority, Asian Racing Federation, Leagues Club Australia, Australian Cricketers Association, Star Entertainment, CAMH, Behavioural Insights Team, National Council on Problem Gambling, GambleAware, GREO, Informa, and Washington State Council, European Lotteries Association. SG holds unpaid appointments as an invited member on the NSW Independent Panel on Gambling Reform, is the Pillar Champion for Technology and Environment for the QLD Responsible Gambling Advisory Committee, is a board member for the Asian Racing Federation Council on Anti-Illegal Betting and Related Financial Crime. SG receives an honorarium for her role as Co-Editor-in-Chief for International Gambling Studies from Taylor & Francis. DC has worked on projects funded through the University of Sydney from West HQ and the ICRG. RH has worked on a project funded by Responsible Wagering Australia (a representative body of Australian online wagering operators; University of Sydney, 2019–2021) and as an independent, sub-contracted statistical consultant for PRET Solutions Inc on a commissioned project (funded by the Australian Casino operator Crown; 2023). RH and SG are named investigators on a grant from the ICRG in 2023.

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