

## Observable indicators and behaviors for the identification of problem gamblers in venue environments

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*Background and aims:* In many jurisdictions, where gambling services are provided, regulatory codes require gambling operators to apply a duty of care toward patrons. A common feature of these provisions is some expectation that venue staff identify and assist patrons who might be experiencing problems with their gambling. The effectiveness of such measures is, however, predicated on the assumption that there are reliable and observable indicators that might be used to allow problem gamblers to be distinguished from other gamblers. *Methods:* In this study, we consolidate the findings from two large Australian studies ( $n = 505$  and  $n = 680$ ) of regular gamblers that were designed to identify reliable and useful indicators for identifying problem gambling in venues. *Results:* It was found that problem gamblers are much more likely to report potentially visible emotional reactions, unusual social behaviors, and very intense or frenetic gambling behavior. *Discussion and conclusions:* This study shows that there are a range of indicators that could potentially be used to identify people experiencing problems in venues, but that decisions are most likely to be accurate if based on an accumulation of a diverse range of indicators.

**Keywords:** problem gambling, identification, customer behavior, staff training, harm minimization

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### INTRODUCTION

In recent years, an increasing emphasis of public policy has been directed toward the prevention of gambling-related harm. This ideology is borne out of the application of public health frameworks that consider problem gambling to be the most extreme manifestation of a problem that can be observed to varying degrees in the general community (Brown, 2000; Brown & Raeburn, 2001; Korn & Shaffer, 1999; Productivity Commission, 2010). Public health approaches can typically be seen as falling on a continuum. At one end, there are primary interventions that attempt to affect the behavior of a large population of consumers of a potentially harmful product or service; at the other are tertiary services that provide intensive interventions and services for those who have already experienced significant harm. In between these two extremes are secondary interventions, which aim to reduce or prevent harm in populations known to be at greatest risk. In the context of gambling, one of these populations is regular gamblers on continuous forms of gambling of whom between 10% and 15% have been found to be experiencing problems associated with gambling (Productivity Commission, 1999, 2010).

Secondary interventions are typically applied in the context, where at-risk behavior occurs. For most forms of gambling, this context is the location or venue at which people go to gamble (Hing & Dickerson, 2002). In recognition of this, many jurisdictions, including those in Australia, have introduced codes of practices that apply to gambling operators. The

strength and depth of these codes vary with some codes mandated within legislation and some voluntary codes developed in collaboration with industry. The codes generally emphasize that venues are required to conduct their operations in a manner that affords a duty of care toward patrons and which maintains a “responsible gambling” environment (Hancock, Schellinck, & Schrans, 2008). A common feature of these provisions is that staff are required to take reasonable steps to assist if they observe patrons who appear to be showing signs of hardship associated with their gambling.

Such provision operates on the assumption that staff should have a reasonable understanding of problem gambling and be aware of what visible signs might indicate which patrons are experiencing difficulties. Accordingly, in almost all parts of Australia, gambling licenses are only issued to venues if the staff undertake various levels of mandatory training that includes some materials about the warning signs of problem gambling. However, until recently, a difficulty with these policies was that there was little research available to help inform these training programs; in particular, what range of visible indicators might be used to assist in the reliable identification of problem gamblers in situ. These concerns are described, for example, in a review by Allcock (2002) that documents the views of a number of international experts and

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the practical challenges associated with identification methods. The general consensus was that potential indicators probably did exist, but that research was needed to determine their nature and whether they could be observed and validated against other criteria (Delfabbro, King, & Griffiths, 2012).

To help inform this area, a few researches have emerged, which have sought to examine the potential behaviors that might be used to differentiate between problem and non-problem gamblers. One of the first of these studies was reported by Schellinck and Schrans (2004). In their study, 927 video-lottery (VLT) players in Canada were surveyed about a range of potential indicators of harm. The research showed that there were a range of social, emotional, and behavioral indicators that reliably differed between problem and other gamblers. Certain behaviors (e.g., strong emotional reactions) were rarely observed in non-problem gamblers, and most others were much more commonly observed in problem gamblers. The authors argued that single indicators on their own were unlikely to be useful; however, by using multiple indicators, it would be theoretically possible to identify problem gamblers with some confidence, although they expressed reservations about the likelihood of such information being observable on any one occasion. Similar reviews were expressed in a paper by Hafeli and Schneider (2006) who conducted research into the potential value of indicators in Swiss casinos. In contrast to Schellinck and Schrans (2004) who included some physiological indicators (e.g., heart racing) which would not be externally observable, all of the indicators in this subsequent study were potentially observable. Indicators were divided into a range of categories that include: frequency and duration; raising the funds; betting behaviors; social behaviors; reactions and behaviors while happening; and other behaviors. This range of indicators was used in training for staff working in Swiss casinos and extended existing casino procedures that logged incidents for players of interest who could be unilaterally excluded if their behavior indicated the presence of harm.

These findings were further extended in a large Australian project undertaken by Delfabbro, Osborn, McMillen, Neville, and Skelt (2007), which involved a variety of different research strategies including: a survey of 680 regular gamblers; interviews with venue staff and counselors; and extensive observational work. The main survey asked gamblers who scored at different levels on the Problem Gambling Severity Index (PGSI) to rate how often they engaged in a range of behaviors. Categories were similar to those used by Hafeli and Schneider (2006), but extended to include other items recommended through consultations with researchers in the field and reading the existing literature (e.g., Allcock, 2002). The results showed that all indicators were significantly more prevalent in problem gamblers across the full range of indicators with the largest and most reliable differences observed for social and emotional behaviors. The research confirmed Schellinck and Schran's (2004) observation that a combination of indicators needed to be observed in order for reliable differentiation between problem and non-problem gamblers. A limitation of this study, however, was that the findings were based upon only one sample and, due to the timing and the scale of the project, it was not possible to include some potentially useful indicators. Accordingly, in 2013, a replication study was undertaken using another

sample of regular gamblers. The aims of the project were to examine: (a) the consistency of the findings across the two samples as based on the prevalence of different indicators in problem gamblers and the extent to which they differentiated between problem gamblers and other regular gamblers; (b) the utility of several new indicators; and (c) the extent to which problem gamblers could be classified with a high degree of confidence using a combination of indicators.

## METHODS

Two studies conducted 6 years apart (2007 and 2013) were used to inform the findings in this study. Both of these studies had similar aims and used similar measures, although there were some differences in the strategies used to obtain the samples. In both cases, the main aim of the sample recruitment process was to obtain a sample of people who had a regular involvement in gambling and who could be differentiated in terms of their level of gambling risk. Given that the prevalence of problem gambling in the general community is generally lower than 1%, it was not feasible to achieve a sufficiently powered research random sampling method (e.g., random telephone surveys or online panels). For this reason, targeted sampling was used to obtain participants from population groups with a higher probability of experiencing problems with gambling. Both studies used very similar measures, and these are summarized below along with a description of refinements made to the second (or 2013) survey.

### *Participants*

*The first study: 2007 survey.* The same dataset as used by Delfabbro et al. (2007) was used in the present set of analyses. This dataset included responses from 680 people (300 men or 44.1% and 380 women or 55.95%) who reported at least fortnightly involvement with a continuous form of gambling (gaming machines, casino table games, or wagering activities) were recruited using community advertising or outside gaming venues in South Australia (Delfabbro et al., 2007). The sample was drawn from three Australian jurisdictions (South Australia, New South Wales, and the Australian Capital Territory). Just under a quarter were aged 18–35 years (22.5%), 39% were aged 36–55 years, and the remainder were aged over 55 years. The group was generally culturally similar (around 90% were born in English-speaking countries) and only 3.5% reported being from an Indigenous background. Analysis of annual gambling participation rates showed that the entire sample reported playing electronic gaming machines (EGMs); a quarter reported playing casino table games; and 50% reported having engaged in at least one form of wagering activity. Analysis of fortnightly (or regular participation patterns) showed that 80% were regular EGM players. Only two people indicated that they were regular table game players but did not gamble on gaming machines.

*The second study: 2013 survey.* The same dataset as used by Thomas, Delfabbro, and Armstrong (2014) was used for this analysis. This dataset included responses from 505 people (225 women or 44.5% and 280 men or 55.4%) who reported gambling on EGMs at least fortnightly from across

Australia were recruited nationally using targeted advertising via social media platforms such as Facebook and through advertising placed in venues in the States of Victoria and South Australia. The women ranged in age from 18 to 98 years (Mean age = 43.61,  $SD = 15.71$ ) and the men in age from 18 to 82 years (Mean age = 34.84,  $SD = 16.05$ ). All of the participants in this sample had necessarily gambled on EGMs at least once in the previous year with 46% also having played casino table games and 67% had engaged in at least one form of wagering.

### Measures

*Demographics and gambling frequency.* These questions captured the participants' gender, age, country of birth, state of residence, and a number of other characteristics (see Thomas et al., 2014). Both studies included measures of the frequency and type of gambling participated in over the previous 12 months. In each case, the frequency was measured on a 9-point scale, where 0 = (0 times over the past year) and 9 = (More than 5 times a week).

*Problem gambling.* The *Problem Gambling Severity Index* (PGSI; Ferris & Wynne, 2001) is a part of the Canadian Problem Gambling Index. This was used to assess the severity of problem gambling for this study. The PGSI consists of 9 items and captures both gambling behavior (e.g., "Have you gone back another day to try to win the money you lost?") and the adverse consequences of gambling (e.g., "Has your gambling caused you any health problems including stress or anxiety?"). Items are rated by participants on a 4-point scale, where 0 = (Never) and 3 = (Almost always). Scores are summed across the whole scale and ranged from 0 to 27. Risk levels as set by Ferris and Wynne (2001) were as follows: 0 = non-problem gambling, 1–2 = low-risk gambling, 3–7 = moderate-risk gambling, and 8+ = problem gambling. Research indicates the PGSI is psychometrically sound with demonstrated high internal consistency ( $\alpha = .84-.92$ ), stability (test–retest at 3–4 weeks .78), and validity with high correlations between the PGSI and other measures of problem gambling (Ferris & Wynne, 2001). Cronbach's  $\alpha$  was over .90 in both samples.

*Visible behaviors and indicators.* A detailed *Checklist of Visible Indicators* was developed in the 2007 study based on the methodological strategies used by Schellinck and Schrans (2004) and also by Hafeli and Schneider (2006). These methods included a detailed review of the gambling literature: Allcock's (2002) expert review, the two studies described previously as well as consultations with gambling counselors and industry respondents. Respondents were presented with a series of statements and were asked to report how often they engaged in the particular behavior on a verbal-numeric scale, 1 = Never (0% of the time), 2 = Rarely (Fewer than 1 in 4 times you gambled), 3 = Occasionally (25–50% of the times you gambled), 4 = Frequently (50% of time or more often), and 5 = Always (100% of the time). Indicators were divided into categories similar to those used by Hafeli and Schneider (2006), but the range of items was extended to include items arising from other sources, including consultations with venue workers, counselors, and researchers working in the field (see Delfabbro et al., 2007 for a summary). Indicators were not specifically

categorized when administered. Original items related to gambling in general, some referred to casino games and EGMs, whereas most related to EGMs because of the pervasiveness and importance of this type of gambling in Australia.

The original list of indicators used in the 2007 sample was extended in the 2013 study to include items that were developed in the course of that study. The 2013 study also made some minor revisions to items referring to casino games and to the question stem as the scope of this study related to gambling in EGM venues. The final Checklist of Visible Indicators for the 2013 study comprised 52 items and these were divided into six categories. In total, 12 items related to the frequency, duration, and intensity of gambling (e.g., "Gambled for 5 hours or more without a proper break"); 5 items related to impaired control ("Gambled when the venue was closing"); 8 items captured social behaviors ("Asking staff to tell others that they were not at the venue"); 9 items related to raising money or chasing behaviors ("Leaving the venue to find money"); 11 items related to emotional responses ("Displayed anger in venues"); and 7 items relating to various other behaviors, such as drinking alcohol while gambling, a decline in grooming/appearance, irrational attributions for losing, and avoiding the cashier.

*Sampling procedure.* In 2007, participants were recruited by a professional marketing company outside a random sample of clubs and hotels in South Australia as well as by advertisements placed into community newspapers. Participants who completed surveys face-to-face or returned surveys were paid a \$25–30 honorarium. In 2013, short advertisements were placed on Facebook and participants could click on a link that took them to the study survey. Similarly, those who responded to recruitment flyers in venues could follow a link to complete the survey online. Contact details were sought to provide a \$30 honorarium, but all data were converted to a de-identified form in the final data analysis.

### Analytical strategy

Comparative groups used in analysis were (a) those who had been identified as experiencing severe harm from their gambling designated as "problem gamblers" and (b) other regular gamblers. Groups were classified according to original cutoff scores on the PGSI for problem gamblers (scores of 8 or higher vs. scores of 7 or lower) used by Ferris and Wynne (2001). We acknowledge that the second group is not free from harm. This classification method was used as it is the most conservative and aligns with a practical need to primarily identify gamblers who would be most likely to benefit from being considered at-risk of harm in venues.

IBM SPSS v. 21 was used for all statistical analyses. To analyze the prevalence of indicators in both studies, we examined the probability of reporting a given indicator at least "rarely" by problem gamblers and by other gamblers. These risk ratios indicated the extent to which each indicator was more likely to be observed in problem gamblers as opposed to other gamblers. High ratios would indicate that a particular indicator was much more likely in problem gamblers. Comparisons of the consistency of these risk ratios across the two studies as well as their rank ordering in magnitude provide an indicator as to how consistently and

reliably they vary between gambler groups. A second set of analyses examined the extent to which indicators could be used to classify participants as problem versus other gamblers. Logistic regression models used binary predictor variables (0, 1) to denote the presence or absence of self-reported behaviors, and the dependent measure (gambler group) was based on the PGSI classifications (scores of 8 or higher vs. scores of 7 or lower).

### Ethics

As detailed in the original reports (Delfabbro et al., 2007; Thomas et al., 2014), both studies received ethical approval prior to being conducted.

## RESULTS

### Gambling status of sample

Participants were classified into groups based on the PGSI classifications. As indicated in Table 1, the sampling strategy was generally successful in obtaining good representation of the different risk groups. In the first survey, 20% of the sample was classified as problem gamblers and a figure of 40% was obtained for the second survey. The reason for the higher proportion obtained in the second survey is that the social media advertising appears to have attracted a greater proportion of people with a heavier involvement in gambling. In 2007, many of those who participated did not gamble so intensively. Despite these differences, both surveys provided a sufficiently diverse sample to allow comparisons across risk levels.

### Comparison of the prevalence of indicators in 2007 and 2013

The proportion of problem and other gamblers who reported having engaged in a particular behavior in the previous 12 months (rarely or more often) is displayed in Table 2.  $\chi^2$  tests confirmed that all of these behaviors were found to be significantly more prevalent in problem gamblers than other gamblers in both studies. The correlation between the percentage endorsement of items included in both surveys was very high,  $r(36) = .91, p < .001$ , which suggests that the relative prevalence of indicators across the range of items was very similar in both surveys. This was further confirmed by comparing the mean prevalence of indicators that showed no significant difference between the groups,  $t(35) < 1$ . Inspection of Table 2 indicates that there are many indicators that are reported by almost all problem gamblers

(e.g., trying to win obsessively on a given machine, putting large amounts back into the machine to keep playing). On the other hand, there are also indicators that are less commonly reported (e.g., telling other people to say that the gambler is not there and asking for loans or credit).

### Comparison of risk ratios

The two samples were also compared in relation to risk ratios calculated for each indicator recorded in the two studies. Risk ratios indicate the proportion of problem gamblers as compared to other gamblers who report a given behavior. Inspection of Table 3 shows that there are certain behaviors that are much more likely to differ between the two groups of gambler. The largest differences are observed for social and emotional behaviors and items relating to borrowing and credit, whereas the ratios are generally lower for behaviors relating to duration and intensity. A correlation analysis showed that the ratios observed for 2013 were highly correlated with those obtained for the same items administered in the 2007 survey  $r(36) = .88, p < .001$ . Another important finding was that there was a strong negative correlation between the risk ratios and the prevalence of the behaviors in problem gamblers,  $r(52) = -.69, p < .001$ , as based on the 2013 indicator list. In other words, when the prevalence of a particular behavior was generally lower in problem gamblers, the risk ratio was generally higher. These were behaviors that were rarely reported (e.g., asking for loans or credit) and which were typically only reported by problem gamblers.

### Most frequently reported behaviors

As a further indicator of the reliability of items, we examined the more common indicators displayed frequently or always by problem gamblers in the 2013 study compared to the earlier 2007 study (for indicators that were included in both studies). See Table 4 for the prevalence of indicators observed frequently or always in problem gamblers across the two studies. The list was restricted to behaviors reported "often" or "always" by at least 25% of problem gamblers in 2013. These figures were also highly correlated across the two surveys,  $r(36) = .70, p < .001$ , which indicate broad consistency in the prevalence of the most commonly reported and potentially observable problem gambling indicators.

### Logistic regression: Strongest predictors of problem gambling status

Logistic regression was undertaken using the complete indicator list in 2013 to examine which variables were the best predictors of problem gambler status taking into account relationships between behaviors. Initial models were run for each group of indicators (e.g., intensity, duration, and social behaviors) to identify the strongest indicators for a final model. Variables that did not prove to be significant in these individual regressions were dropped and the final model was developed based only on the significant variables. This modeling strategy appeared to be more effective than merely modeling the total number of indicators reported for each gambler. For example, if one used the count of indicators with higher odds ratios, the model

Table 1. PGSI classifications for the 2007 and 2012 surveys

	2007 <i>N</i> = 680 <i>N</i> (%)	2013 <i>N</i> = 505 <i>N</i> (%)	Total <i>N</i> = 1,185 <i>N</i> (%)
No and low risk	398 (58.5)	149 (29.5)	547 (46.2)
Moderate risk	144 (21.1)	148 (29.3)	292 (24.6)
Problem gamblers	137 (20.1)	201 (40.0)	338 (28.5)

Table 2. Prevalence of self-reported behavioral indicators in problem gamblers (2007 and 2013)

Indicators	%			
	2013		2007	
	PG	OG	PG	OG
<i>Frequency, intensity, and duration</i>				
Gambled daily	74	32	66	28
Gamble for more than 3 hr without a break of more than 15 min	91	48	87	43
Gamble for more than 5 hr without a break of more than 15 min	72	21	–	–
Gambles intensely (does not react to external stimuli)	82	25	91	25
Plays very fast (inserting money/pushing buttons rapidly)	87	43	92	43
Bet \$2.50 or more per spin most of the time	89	46	–	–
Plays on quickly after wins (not listening to music or jingle)	91	64	96	60
Rush from one machine to another	85	47	80	30
Gamble on two or more machines at once	60	23	–	–
Gamble continuously	91	43	91	31
Spend more than \$300 in one session of gambling	87	34	–	–
Significant change (increase) in expenditure pattern	90	46	–	–
<i>Impaired control</i>				
Stop gambling only when the venue is closing	73	24	74	28
Gamble right through your usual lunch break or dinner time	70	16	66	17
Find it difficult to stop gambling at closing time	69	16	69	15
Try obsessively to win on a particular machine	94	61	93	54
Start gambling as the venue is opening	57	19	65	25
<i>Social behaviors</i>				
Ask venue staff to not let people know they are there	31	4	16	2
Have friends or relatives call or asking if you are still there	43	8	42	8
Act rudely or impolitely to venue staff	35	6	23	8
Avoid contact or communicate very little with anyone else	79	33	84	31
Stay on to gamble while your friends leave the venue	73	27	77	32
Become very angry if someone takes favorite machine/spot	67	20	70	21
Brag about winning or make a big show of gambling skill	62	32	–	–
Stand over other players while waiting for favorite machine	46	13	–	–
<i>Raising funds/chasing behavior</i>				
Get cash out (ATM/EFTPOS) on 2+ occasions in single session	92	50	89	43
Ask to change large notes at venues before gambling	76	41	90	43
Borrow money from other people at venues	42	6	54	11
Ask for a loan or credit from venues	25	2	16	1
Put large win amounts back into the machine and continue playing	93	40	95	47
Leave the venue to find money to continue gambling	81	18	85	23
Rummage around in your purse or wallet for additional money	89	50	–	–
Run out of all money including in purse/wallet when leave	95	45	–	–
Use the coin machine at least four times in a session	85	28	–	–
<i>Emotional responses</i>				
Find yourself shaking (while gambling)	38	11	60	6
Sweat a lot (while gambling)	62	13	58	7
Feel nervous/edgy (e.g., leg switching and bites lip continuously)	80	31	85	19
Display your anger (e.g., swearing to yourself and grunts)	69	27	55	9
Kick or violently strike machines with fists	42	7	23	4
Feel very sad or depressed (after gambling)	95	44	94	36
Cry after losing a lot of money	62	8	58	5
Sit with your head in hands after losing	58	10	68	12
Play the machine very roughly and aggressively	54	14	–	–
Groan repeatedly while gambling	63	21	–	–
Feel a significant change in your mood during sessions	92	42	–	–
<i>Other behaviors</i>				
Gamble after having drunk a lot of alcohol	62	45	56	36
Avoid the cashier and only use cash facilities	71	18	–	–
Notice decline in grooming/appearance	56	5	–	–
Blame venues or machines for losing	69	25	74	23
Complain to staff about losing	40	8	37	10
Swear at machines or venue staff because you are losing	42	10	49	21
Compulsively rub the machine	49	24	–	–

Note. “–” indicates variables that were developed as a part of the 2007 study (and so were not a part of that initial survey). PG = problem gamblers, OG = other gamblers, “%” refers to the percentage of each category of gambler who reported the behavior at least “rarely” or more often.

Table 3. Comparative problem/other gambler risk ratios: 2013 versus 2007 study

Indicators	Odds ratio	
	2013	2007
<i>Frequency, intensity, and duration</i>		
Gambled daily	2.28	2.36
Gamble for more than 3 hr without a break of 15 min or more	1.95	2.23
Gamble for more than 5 hr without a break of 15 min or more	3.49	–
Gambles intensely (does not react to external stimuli)	3.26	3.64
Plays very fast (inserting money/pushing buttons rapidly)	2.02	2.14
Bet \$2.50 or more per spin most of the time	1.92	–
Plays on quickly after wins (not listening to music or jingle)	1.43	1.60
Rush from one machine to another	1.80	2.67
Gamble on two or more machines at once	2.36	–
Gamble continuously	2.09	2.94
Spend more than \$300 in one session of gambling	2.55	–
Significant change (increase) in expenditure pattern	1.91	–
<i>Impaired control</i>		
Stop gambling only when the venue is closing	3.00	2.64
Gamble right through your usual lunch break or dinner time	4.55	4.41
Find it difficult to stop gambling at closing time	4.35	5.31
Try obsessively to win on a particular machine	1.55	1.72
Start gambling as the venue is opening	3.06	2.60
<i>Social behaviors</i>		
Ask venue staff to not let people know they are there	7.75	8.00
Have friends or relatives call or asking if you are still there	5.35	5.25
Act rudely or impolitely to venue staff	5.70	3.29
Avoid contact or communicate very little with anyone else	2.36	2.71
Stay on to gamble while your friends leave the venue	2.66	2.33
Become very angry if someone takes favorite machine/spot	3.42	3.50
Brag about winning or make a big show of gambling skill	1.95	–
Stand over other players while waiting for favorite machine	3.70	–
<i>Raising funds/chasing behavior</i>		
Get cash out (ATM/EFTPOS) on 2+ occasions in single session	1.85	2.07
Ask to change large notes at venues before gambling	1.56	1.72
Borrow money from other people at venues	6.61	4.91
Ask for a loan or credit from venues	12.7	16.00
Put large win amounts back into the machine and continue playing	2.32	2.02
Leave the venue to find money to continue gambling	4.61	3.70
Rummage around in your purse or wallet for additional money	1.79	–
Run out of all money including in purse/wallet when leave	2.11	–
Use the coin machine at least four times in a session	2.20	–
<i>Emotional responses</i>		
Find yourself shaking (while gambling)	5.71	10.00
Sweat a lot (while gambling)	4.63	8.00
Feel nervous/edgy (e.g., leg switching and bites lip continuously)	2.60	4.42
Display your anger (e.g., swearing to yourself and grunts)	2.53	6.11
Kick or violently strike machines with fists	5.65	5.75
Feel very sad or depressed (after gambling)	2.15	2.61
Cry after losing a lot of money	7.62	11.60
Sit with your head in hands after losing	5.94	5.67
Play the machine very roughly and aggressively	3.89	–
Groan repeatedly while gambling	2.96	–
Feel a significant change in your mood during sessions	2.15	–
<i>Other behaviors</i>		
Gamble after having drunk a lot of alcohol	1.38	1.51
Avoid the cashier and only use cash facilities	4.02	–
Notice decline in grooming/appearance	11.0	–
Blame venues or machines for losing	2.78	3.52
Complain to staff about losing	4.80	3.70
Swear at machines or venue staff because you are losing	4.32	2.45
Compulsively rub the machine	2.02	–

Note. “–” indicates variables that were developed within the 2007 study but which were not available at the time of the quantitative survey.

Table 4. Common visible indicators in problem gamblers 2013 versus 2007

Indicators	%	
	2013	2007
<i>Frequency, duration, and intensity</i>		
Spend more than \$300 in one session of gambling	67	–
Playing on without listening to the jingle	57	44
Rush from one machine to another	46	17
Plays very fast	42	45
Gamble for 3 hr or more without a proper break	41	39
Gambling intensely and lose track of things around them	38	40
Significant change in expenditure pattern	33	–
Bet \$2.50 or more per spin	28	–
<i>Impaired control</i>		
Try to win obsessively on one machine	63	55
Find it difficult to stop at closing time	31	19
Stop only when the venue is closing	27	14
<i>Social behaviors</i>		
Avoid contact	29	34
<i>Raising funds/chasing behavior</i>		
Run out of all available money at venue	50	–
Got cash out 2+ times from ATM or EFTPOS	43	45
Put large amounts of money back into machine	45	39
Rummage around for more money	38	–
Leave the venue to find more money	25	22
<i>Emotional responses</i>		
Feel sad or depressed (after gambling)	50	67
Significant change of mood during session	47	–
Nervous/edgy	25	29
<i>Other behaviors</i>		
Blamed venues or machines for losing	28	32
Gamble after having drunk a lot of alcohol	26	22

Note. “%” refers to the percentage of problem gamblers who engaged in the behavior “frequently” or “always.”

correctly classified 84% of cases, but required 12 indicators for one to be able to identify a problem gambler with at least an 80% probability. By contrast, the model below, which was based on a combination of indicators and which selected the best predictors from earlier models, was much more efficient and provided better predictions.

*Strongest predictors of problem gambling status using full indicator list.* All of the indicators found to be

Table 6. Probability of being classified as a problem gambler (2013 data)

Indicators	Cumulative probability (%)
Feel sad or depressed (after gambling)	5
+ Change in grooming/appearance	22
+ Leave venue to find money	50
+ Bets \$2.50+ per spin most times	75
+ Put wins back into machine	89
+ Gambles through usual lunch break	95

significant in the initial models were entered into the final models to identify the overall strongest indicators of problem gambler status (Table 5) using the 2013 data. This model identifies the risk factors associated with depression, deteriorating appearance, and gambling at odd hours, often and with large bet sizes. Analysis showed that 42.8% of problem gamblers reported displaying all of these behaviors as compared with 1.3% of non-problem gamblers. These indicators may be particularly good at identifying people with gambling problems.

To calculate the probability of a person being a problem gambler based on these results requires the use of the logistic regression formula  $P(E) = \frac{e^z}{1 + e^z}$ , where  $e$  is the exponential and  $z$  is a linear combination of variables,  $B_0$  (constant) +  $B_1 \cdot X_1$  +  $B_2 \cdot X_2$  + ... +  $B_n \cdot X_n$ , where  $B$  refers to the coefficient for each variable and  $X$  refers to the value of the predictor variable (in this case, 0 = absent or 1 = present). By incorporating the values in Table 5 into this equation, it becomes possible to determine the probability of a person being a problem gambler based upon single and multiple predictors (i.e., the accumulated observation of indicators in the venue). Table 6 shows the probability of identifying a person as a problem gambler based on a single predictor and then the effect of adding additional variables. The results show that accumulating five or more indicators is sufficient to identify someone as having a high probability of being a problem gambler. Similar analyses were conducted on the 2007 data (Delfabbro et al., 2007). They similarly found that it was necessary to accumulate multiple indicators to be confident in identifying someone with gambling problems and that the accumulation of five indicators resulted in an 89% probability. Further analysis by Thomas et al. (2014) showed that these results could be replicated. When 2007 models were run using 2013 data (i.e., just confining the analysis to the shorter list of indicators used in the 2007 study), the models were very similar

Table 5. Final model: overall best independent predictors of problem gambler status (2013 data)

Indicators	B	SE	Wald	Odds ratio	95% CI
Constant	-4.50				
Bet \$2.50+ per spin most times	1.10	0.34	10.8	3.01	1.56–5.80
Leave venue to find more money	1.24	0.30	16.6	3.46	1.91–6.27
Feel sad or depressed (after gambling)	1.66	0.41	16.5	5.23	2.53–11.64
Change in grooming/appearance	1.59	0.36	19.4	4.88	2.41–9.88
Gamble through usual lunch break	0.89	0.30	8.6	2.43	1.35–4.41
Put money back in and keep playing	0.98	0.38	6.7	2.67	1.18–5.61

Note.  $p < .001$  for all predictors, 86.9% of cases correctly classified, and Nagelkerke’s  $R^2 = .67$ .

in terms of their composition and classification accuracy. Overall, these results confirm that, while all behaviors on the checklist are indicators of potential harm, the observation of multiple indicators in a gambler increases confidence in identification by a third party.

## DISCUSSION

The aims of the project were to examine: (a) the consistency of the findings across the two samples as based on the prevalence of different indicators in problem gamblers and the extent to which they differentiated between problem gamblers and other regular gamblers; (b) the utility of several new indicators; and (c) the extent to which problem gamblers could be classified with a high degree of confidence using a combination of indicators.

The results from both studies show that the prevalence of indicators is higher in problem gamblers across a range of domains with the strongest differences typically observed for emotional and social behaviors. Problem gamblers report gambling more quickly, frenetically, and intensely than other gamblers and they play for longer periods. They also report engaging in more frequent behaviors relating to the procurement of additional funds for gambling and are more likely to report gambling when venues open or close or through regular meal times. Problem gamblers were found to be considerably more likely to report displaying emotional distress (e.g., anger, sadness, and signs of distress) and would engage in anti-social behaviors (e.g., lying to others, rudeness to staff, and blaming others for losses) that were rarely reported by other gamblers. Behaviors, such as seeking credit and loans from others in the venue, were generally uncommon and almost always reported by problem gamblers.

Despite some differences in the range of items, both surveys generally revealed very similar risk profiles. We found very high correlations between the two surveys in relation to the reported prevalence of different indicators in problem gamblers and also in the risk ratios observed. In other words, the surveys provided some confidence that the indicators reliably differ by gambling risk level and that their ability to discriminate between gamblers was consistent.

Indicators typically fell into one of the two broad categories. The first category included higher prevalence indicators with lower risk ratios, which suggested that they were likely to be observed in venues but also that they were fairly commonly observed in regular gamblers. A second category included low prevalence indicators (e.g., asking for loans or credit) which were almost always reported by problem gamblers, but only by a minority of this group. Thus, these behaviors are likely to be very good indicators of problematic gambling but less likely to be observed.

As confirmed by a large negative correlation between the prevalence and the risk ratios, this suggests that the selection of indicators for practical use in venues is fraught with a trade-off. On the one hand, a list constructed solely from the high risk indicators will comprise indicators that are very rarely seen, therefore limiting its usefulness. On the other hand, a list constructed solely from the more frequent lower risk ratios may result in patrons being incorrectly classified

as problem gamblers. On the other hand, if one relies solely on the more frequently observed indicators, there is a challenge that regular gamblers who are not experiencing problems may be incorrectly classified as experiencing problems. Unless carefully managed, approaching these patrons may lead to resentment. As a result, our modeling shows that a more judicious approach is to base judgments on a balance or combination of different sources of evidence.

This does not mean that staff should hold back from approaching customers until they are absolutely certain that there are severe problems, rather that approaches should be cautious. This may mean that staff begin by engaging patrons in general conversation rather than directly discussing gambling. Approaches might be socially oriented and focused around the customer's satisfaction with their present gaming experience. This may provide the customer the opportunity to express their potential frustrations. This may confirm the staff observation and give the staff member the affirmation necessary to take a further step in discussing the patron's gambling more directly as well as options for managing this (e.g., available pre-commitment technology, initiating self-exclusion, or contacting counseling agencies). Experienced and highly trained staff have described using this conversational approach effectively (Thomas et al., 2014).

First, the results from the logistic model showed that indicators usually need to be considered in combination rather than in isolation. Second, it showed that only a small number of indicators are required to consider that certain problems exist, and third, it also showed that different types of indicators need to be included. As observed, identification appears to be best guided by a focus on combined observation of variables relating to the emotional state of the gambler; the intensity and frenetic natures of their gambling; and, variations from usual social conventions which might include disheveled or declining grooming, statistically unusual visitation patterns (e.g., leaving the venue to obtain additional funds or gambling through normal meal times). These findings are generally consistent with earlier findings reported by Schellinck and Schrans (2004), although our more recent studies include a wider range of indicators. Schellinck and Schrans (2004) were generally pessimistic about the potential practical value of models of this nature because they argued that the probability of observing a range of indicators at a single venue and at a single point of time is likely to be low. This conclusion is not one that we necessarily dispute. However, as Hafeli and Schneider (2006) and Allcock (2002) have argued, it is possible for venues to create logs or registers that record multiple observations about individual patrons over an extended period. Thus, it may be possible for multiple indicators to be compiled over many different occasions and perhaps with the involvement of more than one staff member.

Our findings suggest that simple indicators based on the intensity or volume of gambling are potentially less useful than those relating to social and emotional behaviors when observed in isolation. Although problem gamblers do gamble more intensely and for longer periods than other gamblers, there are lower risk gamblers who also gamble for

extended periods (e.g., more than 3 hr), who play quickly and often without proper breaks. This is immediately evident from Tables 2 and 3, which shows that the prevalence of gambling sessions lasted more than 3 hr in over 90% of problem gamblers, but the risk ratios were of only 1.95. This implies that this period of gambling is also sometimes reported by just under half of the other group of gamblers (i.e.,  $0.9/x = 1.95$ ). Observation of this behavior without other indicators may therefore lead to inaccurate conclusions. One remedy is to use more extreme measures. For example, when considering long session times, sessions lasting more than 5 hr were reported by over 60% of problem gamblers, but less than 1 in 5 of the other gambler group. This, however, has the potential to result in under-identification of issues as a large proportion of those experiencing significant problems with their gambling failed to report sessions of this length (while over 90% reported sessions of more than 3 hr).

Furthermore, indicators of duration and intensity are potentially challenging in that they require ongoing observation by venue staff. By illustration, an EGM gambler would need to be observed closely for a protracted period to confirm the style of play, the duration of play, and whether he or she has taken breaks. For these reasons, it could be argued that electronic systems that monitor players' behavior perhaps in conjunction with loyalty card or as a part of a comprehensive electronic pre-commitment system could be used to supplement visible indicators (Gainsbury, 2011; Griffiths, 2009; Thomas et al., 2014). Such monitoring systems have been trialed in a number of parts of the world in venues (e.g., Davies, 2007; Focal Research, 2007; Schottler Consulting, 2010; Thomas et al., 2016) and also in online contexts (e.g., Austin, 2007; Auer & Griffiths, 2011; Braverman & Shaffer, 2010; Griffiths & Auer, 2011; LaBrie & Shaffer, 2011; Schellinck & Schrans, 2011; Xuan & Shaffer, 2009).

In relation to the practical application of these findings, we believe that there are several possibilities. Given the reliability of the findings across the two studies, we believe that the full 52-item Checklist of Visible Indicators or the 32-item Gambling Behavior Checklist modified for EGM staff use and detailed in the 2013 study could be used with confidence in the training of venue staff to highlight the range of behaviors that should be considered when working in gambling areas. Training could include in vivo exposure to situations where staff might be asked to observe or identify potentially problematic behaviors. Alternatively, video-based scenarios featuring actors might be used to demonstrate the patterns of behavior that may be indicative of harm. For this to lead to effective outcomes for gamblers who are experiencing harm from their gambling, several additional protocols will need to be in place. First, mandated regulations need to include clear expectations that venues and staff are proactive in the identification of people who may be experiencing significant problems in relation to their gambling. Second, protocols would need to be developed to guide venue staff actions based on the indicators themselves (e.g., specific actions depending on the number and type of indicators displayed). If possible, indicators should be used in conjunction with algorithmic data generated from the analysis of player behavior. As Schellinck, Schrans,

Schellinck, and Bliemel (2015) has pointed out, it is possible to use real-time system data to identify the patterns of behavior that are statistically more indicative of problem gamblers (as based on independent validation using standardized measures). Such data could be used to select certain players for more detailed behavioral observation in the venue.

#### *Limitations and further directions*

It is important to be mindful of the limitations of this study when interpreting the findings. First, the study is based on the self-reported prevalence of potentially observable behaviors rather than the actual observation of real behaviors. It may be that gamblers display more behaviors than they actually report. Second, our models have not been validated against actual behavioral observations in venues. Some preliminary venue research along these lines (Delfabbro, Borgas, & King, 2011) suggests that staff in gaming venues are probably not very good at being able to distinguish between problem and other gamblers when their judgments are compared against the independent data provided by gamblers themselves. This would indicate that the style of approach to any patron thought to be experiencing gambling problems is an important consideration. Third, there were some additional items added in the second survey and the sampling strategy and the prevalence of problem gambling were different than in the first study. In a sense, this strengthens the findings given the fact that we obtained high correspondence between the results obtained in the two studies despite their differences. Finally, while the final logistic regression models emphasized the value of a small number of particular behaviors in identifying problem gamblers, further research is needed to affirm these results. The same models in Delfabbro et al.'s (2007) report emphasized an equally small but different sets of particular behaviors.

In future studies, it will be useful to consider how the different types of indicator (low and high prevalence) perform in practical applications. A useful extension would be to consider whether indicators can differentiate between different levels of gambling risk; for example, provide indications of moderate- and low-risk gamblers. Given interest in early prevention of harm, it would be potentially useful to know if there are indicators that might help staff to identify patrons who are starting to show signs of harm for continued engagement and observation. Finally, it is important for future papers to examine the indicators in action – which indicators are easily observed by staff within venues and what staff do with this information.

## CONCLUSIONS

In summary, the results presented in this study indicated that that a range of potentially visible indicators of problem gambling are consistently reported more commonly by gamblers experiencing problems compared to other regular gamblers and that multiple indicators would need to be observed to identify them with a high degree of confidence. Although final models indicate that very specific sets of indicators give the best likelihood of identification, such indicators may not always be observed at the same time.

Users of indicator lists are encouraged, therefore, to look for a range of different indicators (i.e., not just those which fall into one category) and to base their judgments on an accumulation of evidence wherever this is possible.

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