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An examination of participation in online gambling activities and the relationship with problem gambling

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Background and aims: Online gambling participation is increasing rapidly, with relatively little research about the possible effects of different gambling activities on problem gambling behaviour. The aim of this exploratory study was to examine the participation in online gambling activities and the relationship with problem gambling among an international sample of online gamblers. *Methods:* An online gambling survey was posted on 32 international gambling websites and resulted in 1,119 respondents over a four-month period. *Results:* Poker was the most popular gambling activity online. A number of online activities were associated with problem gambling, including: roulette, poker, horse race betting, sports betting, spread betting and fruit (slot) machines. Not surprisingly, those that gambled on these activities regularly (except poker) were more likely to be a problem gambler, however, what is interesting is that the reverse is true for poker players; those that gambled regularly on poker were less likely to be a problem gambler compared to the non-regular poker players. The majority of the players also gambled offline, but there was no relationship between problem gambling and whether or not a person also gambled offline. *Discussion:* Problem gambling is associated more with certain online gambling activities than others, and those gambling on two or more activities online were more likely to be a problem gambler. *Conclusion:* This paper can help explain the impact different online gambling activities may have on gambling behaviour. Consideration needs to be given to the gambling activity when developing and implementing treatment programmes.

Keywords: problem gambling, online gambling, internet, addiction, gambling activity

INTRODUCTION

There are many different terms that can be used when describing excessive and persistent gambling but broadly, gambling disorders can be defined as persistent and recurrent maladaptive gambling that disrupts personal, family or vocational pursuits (*Diagnostic and Statistical Manual of Mental Disorders*, 4th ed., DSM-IV; American Psychiatric Association, 1994). The term problem gambling is common among many researchers and organisations to describe the broad spectrum of gambling-related problems (Griffiths, 2007; Sproston, Erens & Orford, 2000), and in this paper the term problem gambling is used to refer to all gambling behaviour associated with harmful effects.

Causes of problem gambling are multidimensional but it is thought that some activities may be more problematic than others and different activities may attract different types of people. For example, males are more likely to prefer sports betting and poker, while females are more likely to prefer slot machines or bingo (Ladd & Petry, 2002; Potenza et al., 2001; Wenzel & Dahl, 2008). Research has begun to focus on the types of games as a potential primary cause of problem gambling. In addition, gambling online is considered to be an additional risk factor for gambling problems, perhaps more than offline gambling activities (Griffiths, Wardle, Orford, Sproston & Erens, 2009), due to factors such as anonymity, convenience, escape, dissociation and disinhibition (Griffiths, 2003). A number of studies have found that prob-

lem gambling prevalence rates are significantly higher among online gamblers than offline gamblers (Griffiths et al., 2009; Ladd & Petry, 2002; Wood & Williams, 2009, 2011). To date, these few studies provide some support to suggest there is an elevated risk of problem gambling amongst online gamblers, and this risk is greater than offline gambling forms, indicating a need for further research.

Given specific types of activities online may attract different populations and have different impacts, the evaluation of gamblers' actual online behaviour, may provide a more comprehensive account of behaviour patterns and insight into gambling problems (LaBrie, Kaplan, LaPlante, Nelson & Shaffer, 2008).

LaPlante, Schumann, LaBrie and Shaffer (2008) conducted a longitudinal analysis (18 months) of online gambling behaviour among a population of new subscribers to a sports betting online gambling service. They found that most subscribers adapted their behaviour after a month by reducing their participation, bets, and bet size, but heavily involved bettors failed to adapt and maintained a high level of involvement. In a similar study, LaBrie, LaPlante, Nelson, Schumann and Shaffer (2007) found that a small percentage

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of online gamblers (1%) who subscribed to an online betting service showed behaviour atypical to the norm. When examining tracking behaviour it may be important to look at unusual patterns of play and changes in behaviour to identify possible problem gamblers (LaBrie et al., 2007). These studies only examined sports betting behaviour, and therefore there may be issues in application to other forms of online gambling.

An expansion of LaBrie et al. (2007) cohort study, explored actual online casino gambling behaviour in a longitudinal study. LaBrie et al. (2008) found two styles of casino play in their sample: some played on more days but for a shorter period; while others played less frequently but for a longer period of time. Both styles had similar outcomes in terms of the money they lost. As noted in the analysis of online sports gamblers (LaBrie et al., 2007), a small percentage (5%) of the online casino gamblers showed more extreme gambling than the norm; and a greater proportion of casino gamblers participated in more extreme gambling behaviour than did online sports bettors (1%). Generally the online casino bettors spent more on gambling in a typical day, but gambled less frequently than the online sports bettors. It is worth noting that only the data for the patrons playing casino games were analysed. They proposed that because only 9% of the cohort played casino style games it was not a particularly popular gambling activity among sports bettors. Therefore, rather than gamblers having a general interest in online gambling, players are likely to be quite selective in what they choose to play.

There is evidence to suggest that the number of gambling activities a person participates in can impact on problem gambling. Previously it was thought that an individual with problem gambling would focus on one specific gambling activity rather than playing a wide variety of games (Grant & Kim, 2001). However, recent studies (including Wood & Williams, 2009; and the two British Gambling Prevalence Surveys [Wardle et al., 2007, 2011]), found that problem online gamblers were significantly more likely to gamble on a greater number of gambling activities than non-problem online gamblers. Furthermore, those using multiple online gambling activities were more likely to be spending more time gambling compared to those only gambling on one activity (Wardle et al., 2011).

Young and Stevens (2009) carried out secondary analysis using data from the 2005 Northern Territory Gambling Prevalence Survey (Young et al., 2006). They conducted principal components analysis of participation in eight different gambling activities to explore the underlying structure of participation ($n = 9,627$). Certain social variables (residential location, i.e., urban versus remote; age, gender, and position in the social structure) were found to affect the degree of engagement with different gambling activities (i.e., games of chance or games of skill). However, several variables (place of birth; place of birth of parents; indigenous status; language spoken at home; level of education; individual income; household income; and number of people in the household) did not show any differences. In summary, they concluded that games of chance were associated with residential remoteness, older people, females, and being either a single parent, separated or widowed. In contrast, games of skill were associated with urban location, males, full-time employment, lone-person households and single status. Therefore, gambling participation is considered somewhat socially patterned; different social groups are likely to gam-

ble on specific gambling modes thus generating particular problem gambling outcomes (Young & Stevens, 2009). Whether the same can be said of online gamblers remains to be seen.

Relationships also exist between different gambling activities and problem gambling (Oliveira & Silva, 2001; Wohl, Young & Hart, 2005). Rather than games of skill or games of chance *per se*, individual activities have been found to be associated with problem gambling (Young & Stevens, 2009). Therefore, suggesting that it is the configuration of specific games, rather than the broad structure of activities that influence problem gambling risk. It may be that specific gambling activities play a more important role in predicting problem gambling than do socio-demographic factors (Young, Stevens & Morris, 2008).

Researchers know little about the ways different types of gambling may influence the development of problem gambling and addiction. Online gambling can take many different forms as almost any form of gambling can be played online (e.g., casino type games, lottery, sports betting, poker, etc.). However, as LaPlante, Nelson, LaBrie and Shaffer (2009) comment, we do not know whether different forms pose differential risk to health. Initial research indicates that participation in online gambling is increasing (Woolley, 2003), and that the majority of online gamblers are active in more than one type of gambling activity (Griffiths et al., 2009; Woodruff & Gregory, 2005). However, there is much more to explore. Game-play patterns such as frequency, duration and preferred type of play, remain under-researched (Wood & Williams, 2007a).

The internet also provides players with a greater opportunity to play multiple games. Some individuals engage in multi-gambling, such as playing multiple poker tables in order to improve their hourly rate without needing to play high stakes. These players are those more likely to be making a living from playing poker (McCormack & Griffiths, 2012a, 2012b). Griffiths, Parke, Wood and Rigbye (2010) also found similar findings in their online survey of online poker playing among university students. There is lots of anecdotal evidence as to why players engage in multi-gambling. Opportunities exist for players to play multiple games at the same time (e.g., playing multiple poker games online), providing additional betting opportunities and thus creating a higher perceived sense of winning through multiple winning opportunities. It could be hypothesised that additional gambling opportunities in the form of playing multiple games at the same time may be more problematic for vulnerable individuals than games in which players can only play one game at a time, however, this has not been empirically tested. There is a wider lack of empirical research examining the impact of multi-gambling, and in particular the link between multi-gambling opportunities provided online and higher rates of problem gambling. This survey aimed to identify whether there was a relationship between engaging in multi-gambling and problem gambling, and whether there were any specific characteristics unique to those players engaging in multi-gambling online.

While online gambling is becoming much more socially acceptable and readily available, and expanding at a rapid rate, there is insufficient knowledge of online gambling behaviour, including any potential differences between different subsets of gamblers. As Matthews, Farnsworth and Griffiths (2009) note, more research is needed to compare problem gambling rates across specific online gambling ac-

tivities. Different online gambling activities have different characteristics. Therefore, a further aim of this study was to examine the participation of online gambling activities and the relationship with problem gambling behaviour. For example, compared with online sports bettors, online poker players may be completely different in terms of demographics, motivations to gamble, and the experience of gambling. The results may also provide an insight into the relationship between a particular gambling activity and problem gambling. It was considered that the regular gamblers (irrespective of gambling activity) would be more likely to be a problem gambler, and those engaged in multi-gambling would be more likely to be a problem gambler. In terms of specific online activities it was hypothesised that playing online fruit (slot) machines and online casino games would be associated with problem gambling. Although this study aimed to explore participation in online gambling activities and the relationship with problem gambling, it is important to clarify the context of online and offline gambling as used in this study. It is likely that a high proportion of online gamblers are also offline gamblers (Volberg, Nysse-Carris, & Gerstein, 2006; Wardle & Griffiths, 2011). A person may predominantly gamble online and occasionally gamble offline and vice-versa; or a person may choose to only use one form of gambling. Wardle et al. (2011, p. 340) speculate that a 'broader taxonomy of online gamblers may exist, ranging from those who only use the internet to gamble, to those who gamble online and offline on the same activities, to those who engage in different activities in different environments'.

METHOD

Participants

The effective sample size for appropriate analysis was 975 participants. This follows the exclusion of 144 participants for the following reasons; only answering the demographic questions and not answering any of the gambling questions, $n = 129$; indicating they did not gamble online and not answering any of the online gambling questions, $n = 13$; data was felt to be fabricated as they had answered positively, i.e. 'yes', to every question, $n = 2$. The mean age of participants was 34.7 years ($SD = 13.9$ years; range 17 to 80 years) and 81.6% were male.

Development of the survey and questionnaire

The survey comprised 71 questions and included various demographic questions including gender, age, ethnicity, country of residence, employment and education status. Questions concerning the frequency of which they participated in each gambling activity online for money, and the frequency of which they participated in each gambling activity offline, were adopted from a previous study (McBride & Derevensky, 2009). The gambling activities included were: poker, roulette, blackjack, horse race betting, dog race betting, sports betting, spread betting, use of betting exchanges, bingo, fruit (slot) machines, football pools, lottery, instant win games, and other. There were four response options: 'never', 'less than once a month', '1 to 4 times a month' or 'most days'. Participants indicated their response for each of the activities. For the purpose of analysis, those participants that indicated they participated in an activity 'most days'

were classed as a regular gambler for that activity; while those participants who indicated they participated in an activity '1 to 4 times a month', 'less than once a month', or 'never' were classed as non-regular gamblers for that activity. For example, someone who indicated they played poker 'most days' but 'never' played bingo would be classed as a regular poker player and a non-regular bingo player.

The survey also contained questions on the frequency and duration of gambling sessions, motivations for online gambling, and whether they engaged in multi-gambling (ranging from always; very often; sometimes; rarely; and never, on a Likert scale). The survey also contained a problem gambling diagnostic measure (i.e., Problem gambling severity index [PGSI], Ferris & Wynne, 2001). The PGSI has been found to have good psychometric properties, examining gambling involvement, problem gambling behaviour, adverse consequences, and problem gambling correlates (Ferris & Wynne, 2001) and has been used in previous national prevalence studies (e.g., Wardle et al., 2007, 2011). There are four classification categories based on the following cut off points for PGSI scores: 0 = non-problem gambler, or non-gambler; 1–2 = low risk gambler; 3–7 = moderate risk gambler; 8+ = problem gambler.

Procedure

The aim in recruitment was to post the survey on a large number of gambling forums and websites. A pilot test of the survey was carried out before it went online. After contacting moderators and registering on different forums, the survey was advertised on 30 different gambling forums and two gambling websites. Although registration was applied for on 88 different gambling forums, access was not granted for all of these, either because accounts were not approved or moderators did not allow permission to post a link to the survey. The 30 different gambling forums ranged from specific gambling activities (e.g., *PartyPoker*) to more general gambling (e.g., *hpgambling*). The two gambling websites agreed to publicise the survey on their website, and included a short article detailing the purpose of the study. Data collection occurred between January 2010 and May 2010. Ethical approval for the study was granted by the researchers' University Ethics Committee. Informed consent was obtained from all participants.

Analysis

Following calculation of descriptive statistics, Chi-square tests of association were conducted to examine the effect of a range of characteristics of individuals and of the online gambling behaviours among individuals gambling on different activities. Bonferroni corrections were applied to adjust the p value for multiple comparisons. The relevant corrected p value level is presented at the bottom of each table.

RESULTS

Participants

The majority of the participants were male (81.6%). The mean age of the participants was 34.7 years ($SD = 13.95$ years; range 17–80 years) and males were significantly older than females in the sample (male mean age = 36.1 years; $SD = 13.85$; female mean age = 28.5 years; $SD = 12.46$;

Table 1. Frequency of participation in online and offline activities among the total sample ($n = 974$) and the problem gamblers ($n = 115$)

Activity	Never <i>N</i> (%)		Less than once a month <i>N</i> (%)				1–4 times a month <i>N</i> (%)				Most days <i>N</i> (%)					
	Total sample		Problem gamblers		Total sample		Problem gamblers		Total sample		Problem gamblers		Total sample		Problem gamblers	
	Online	Offline	Online	Offline	Online	Offline	Online	Offline	Online	Offline	Online	Offline	Online	Offline	Online	Offline
Poker	370 (38)	463 (47.5)	48 (41.7)	54 (47.0)	140 (14.4)	314 (32.2)	19 (16.5)	37 (32.2)	105 (10.8)	152 (15.6)	18 (15.7)	17 (14.8)	359 (36.9)	45 (4.6)	30 (26.1)	7 (6.1)
Sports betting	484 (49.7)	640 (65.7)	42 (36.5)	55 (47.8)	153 (15.7)	182 (18.7)	16 (13.9)	28 (24.3)	132 (13.6)	99 (10.2)	17 (14.8)	18 (15.7)	205 (21.0)	53 (5.4)	40 (34.8)	14 (12.2)
Horse race betting	619 (63.6)	650 (66.7)	62 (53.9)	58 (50.4)	164 (16.8)	211 (21.7)	22 (19.1)	32 (27.8)	75 (7.7)	76 (7.8)	9 (7.8)	12 (10.4)	116 (11.9)	37 (3.8)	22 (19.1)	13 (11.3)
Betting exchange	789 (81)	NA	84 (73.0)	NA	48 (4.9)	NA	10 (8.7)	NA	43 (4.4)	NA	3 (2.6)	NA	94 (9.7)	NA	18 (15.7)	NA
Spread betting	813 (83.5)	NA	87 (75.7)	NA	44 (4.5)	NA	8 (7.0)	NA	30 (3.1)	NA	4 (3.5)	NA	87 (8.9)	NA	16 (13.9)	NA
Lottery	640 (65.7)	534 (54.8)	75 (65.2)	54 (47.0)	147 (15.1)	222 (22.8)	15 (13.0)	28 (24.3)	159 (16.3)	179 (18.4)	18 (15.7)	22 (19.1)	28 (2.9)	39 (4.0)	7 (6.1)	11 (9.6)
Football pools	824 (84.6)	818 (84.0)	85 (73.9)	88 (76.5)	84 (8.6)	98 (10.1)	18 (15.7)	13 (11.3)	45 (4.6)	47 (4.8)	7 (6.1)	11 (9.6)	21 (2.2)	11 (1.1)	5 (4.3)	3 (2.6)
Blackjack	744 (76.4)	647 (66.4)	65 (56.5)	69 (60.0)	156 (16.0)	259 (26.6)	34 (29.6)	39 (33.9)	55 (5.6)	58 (6.0)	10 (8.7)	5 (4.3)	19 (2.0)	10 (1.0)	6 (5.2)	2 (1.7)
Dog race betting	841 (86.3)	834 (85.6)	92 (80.0)	84 (73.0)	77 (7.9)	102 (10.5)	11 (9.6)	19 (16.5)	38 (3.9)	27 (2.8)	7 (6.1)	8 (7.0)	18 (1.8)	11 (1.1)	5 (4.3)	4 (3.5)
Bingo	851 (87.4)	856 (87.9)	95 (82.6)	95 (82.6)	74 (7.6)	82 (8.4)	11 (9.6)	12 (10.4)	32 (3.3)	28 (2.9)	4 (3.5)	5 (4.3)	17 (1.7)	8 (0.8)	5 (4.3)	3 (2.6)
Fruit machines	836 (85.8)	775 (79.6)	88 (76.5)	81 (70.4)	74 (7.6)	119 (12.2)	14 (12.2)	17 (14.8)	49 (5.0)	67 (6.9)	7 (6.1)	11 (9.6)	15 (1.5)	13 (1.3)	6 (5.2)	6 (5.2)
Roulette	790 (81.1)	718 (73.7)	72 (62.6)	73 (63.5)	138 (14.2)	197 (20.2)	28 (24.3)	27 (23.5)	35 (3.6)	46 (4.7)	7 (6.1)	7 (6.1)	11 (1.1)	13 (1.3)	8 (7.0)	8 (7.0)
Instant win games	778 (79.9)	680 (69.8)	94 (81.7)	75 (65.2)	140 (14.4)	200 (20.5)	12 (10.4)	21 (18.3)	45 (4.6)	70 (7.2)	7 (6.1)	14 (12.2)	28 (2.9)	24 (2.5)	2 (1.7)	5 (4.3)
Private betting	NA	NA	NA	67 (58.3)	NA	NA	NA	28 (24.3)	NA	NA	NA	17 (14.8)	NA	NA	NA	3 (2.6)

NA = not available.

$t(280.398) = 7.14, p < 0.01$). In terms of the ethnicity of the sample there was a wide range of responses. The majority of the participants were Caucasian (86.9%; males = 88.8% and females = 77.7%). The majority of the participants were from the UK (51.6%; males = 45.6%; females = 78.9%) or USA (33.1%; males = 37.5%; females = 13.7%), with 42 other countries mentioned.

Problem gambling level

Note that not all participants answered every question and consequently total sample size may be different in the analysis of different questions. Of those who answered the PGSI questions in the survey, 14% of participants were identified as problem gamblers (71.7% male, 28.3% female). A further 29% were classed as 'at risk' problem gamblers, 32.7% were classed as low-level problem gamblers, and 24.3% were identified as non-problem gamblers. The mean age of the problem gamblers was 34.6 years ($SD = 10.6$, range = 18–56 years). A one-way between subjects ANOVA was conducted to compare the effect of age on problem gambling level. There were no significant differences between mean age across all four groups of problem gambling level [$F(3,806) = 2.33, p = 0.073$].

Offline gambling

A total of 74.1% said they also gambled offline, while 25.9% do not gamble offline at all. A Chi-square test of independence was performed to examine the relationship between problem gambling and whether they also gambled offline. The relationship between these variables was not significant ($\chi^2 = 3.34, df = 3, p > 0.01$). Of those that gambled offline, 64.4% gambled more frequently online compared with offline gambling and 24.7% gambled less frequently online compared with offline gambling, while 10.9% indicated that they gambled about the same online and offline. There was no difference in problem gambling levels in terms of frequency of offline gambling. Whether a person also gambles offline or not is unlikely to be an indicator of online problem gambling status among a sample of online gamblers.

Type of gambling activity

Among activities that were played online, poker was the most participated activity with 36.9% of participants stating that they play online poker 'most days'. This was followed by 21.1% participating in online sports betting, followed by online horse race betting (12.0%). Offline gambling was participated in much less frequently with only 5.4% participating in sports betting 'most days', followed by poker (4.6%), lottery (4.0%), and horse race betting (3.8%). The offline activities were most frequently participated in 'less than once a month' suggesting that offline gambling is participated in less frequently than online gambling (however, this is self-evident as the survey was targeted to online gamblers). Table 1 highlights the activities engaged in among the total sample and their location as offline or online among the total sample.

For problem gamblers, an almost identical pattern was shown. However, sports betting was the most participated activity online with 34.8% indicating they play 'most days'. This was followed by 26.1% participating in online poker

'most days', and online horse race betting (19.1%). Again offline gambling was participated in much less frequently with only 12.2% participating in sports betting 'most days', followed by horse race betting (11.3%), lottery (9.6%) and roulette (7.0%).

Online gambling activity and level of problem gambling

A Chi-square test of independence was performed to examine the relationship between regular gamblers and non-regular gamblers in terms of problem gambling for each of the following online gambling activities: poker, blackjack, horse-race betting, dog-race betting, sports betting, spread betting, betting exchanges, bingo, football pools and lottery. For lottery, football pools, blackjack, dog race betting, bingo, fruit (slot) machines, roulette, and instant win games, the analysis showed that one cell had an expected count less than five, so a Fisher's Exact test was selected for Pearson's chi-square. Table 2 highlights the relationship between regular and non-regular gamblers in terms of problem gambling level for each different online gambling activity.

Compared to non-regular gamblers, the regular gamblers who participated in online spread betting, online fruit (slot) machine games, and online roulette (using Bonferroni corrected p values) were significantly more likely to be problem gamblers. Note online blackjack, online horse-race betting, online dog race betting, online sports betting, and, were also significantly more likely to be problem gamblers using an uncorrected significance level of 0.05. Compared to non-regular online poker players, regular online poker players were less likely to be problem gamblers. There were no differences in terms of problem gambling status between regular and non-regular online betting exchange users, regular and non-regular online bingo players, regular and non-regular online football pools players, regular and non-regular online lottery players, and regular and non-regular instant win players. The regular gamblers who participated in online poker, online horse-race betting, online sports betting, online spread betting, and online betting exchanges were significantly more likely to be male than female. The regular gamblers who participated in online bingo, and online fruit (slot) machines were significantly more likely to be female than male. For a more detailed analysis of the gender differences in online gambling refer to McCormack, Shorter and Griffiths (2012).

Number of activities and multi-gambling

Multi-gambling is defined as simultaneously gambling on two or more games. The question on multi-gambling was created into a dichotomous variable for those regularly engaging in multi-gambling (always, very often) and those not regularly engaging in multi-gambling (sometimes, rarely, never). Of the total sample, 30.6% said they regularly engaged in multi-gambling online. Table 3 highlights the relationship between engaging in multi-gambling; number of regular online gambling activities; gambling offline and level of gambling problem. Those that indicated they participated in two or more activities online regularly were significantly more likely to be a problem gambler or an at-risk problem gambler than those that did not participate in two or more activities online most days ($\chi^2 = 36.14, df = 3, p < 0.001$). At the uncorrected significance level of 0.05 those who were low-level or at-risk problem gamblers were more

Table 2. The relationship between regular (R) and non-regular (NR) gamblers in terms of problem gambling level for each different online gambling activity

Activity	Total sample N = 975 N (%)	Problem gamblers Total N = 115 N (%)	At-risk gamblers Total N = 238 N (%)	Low-level gamblers Total N = 269 N (%)	Non-problem gamblers Total N = 200 N (%)	χ^2	d.f.	p value
Poker **	R 359 (36.8) NR 616 (63.2)	30 (9.5) 85 (16.8)	100 (31.7) 138 (27.2)	122 (38.7) 147 (29.0)	63 (20.0) 137 (27.0)	18.22	3	$p < 0.001$
Sports betting**	R 205 (21.0) NR 770 (79.0)	40 (24.1) 75 (11.4)	60 (36.1) 178 (27.1)	41 (24.7) 228 (34.8)	25 (15.1) 175 (26.7)	30.34	3	$p < 0.001$
Horse race betting*	R 116 (11.9) NR 859 (88.1)	22 (22.9) 93 (12.8)	32 (33.3) 206 (28.4)	29 (30.2) 240 (33.1)	13 (13.5) 187 (25.8)	12.32	3	0.006
Betting exchange	R 94 (9.6) NR 881 (90.4)	18 (22.5) 97 (13.1)	18 (22.5) 220 (29.6)	29 (36.3) 240 (32.3)	15 (18.8) 185 (24.9)	7.33	3	0.062
Spread betting*	R 87 (8.9) NR 888 (91.1)	16 (24.2) 99 (13.1)	22 (33.3) 216 (28.6)	18 (27.3) 251 (33.2)	10 (15.2) 190 (25.1)	9.00	3	0.029
Lottery	R 28 (2.9) NR 947 (97.1)	7 (28.0) 108 (13.6)	8 (32.0) 230 (28.9)	7 (28.0) 262 (32.9)	3 (12.0) 197 (24.7)	5.091	3	0.156
Football pools	R 21 (2.2) NR 954 (97.8)	5 (29.4) 110 (13.7)	7 (41.2) 231 (28.7)	2 (11.8) 267 (33.2)	3 (17.6) 197 (24.5)	6.40	3	0.073
Blackjack*	R 19 (1.9) NR 956 (98.1)	6 (35.3) 109 (13.5)	6 (35.3) 232 (28.8)	4 (23.5) 265 (32.9)	1 (5.9) 199 (24.7)	7.79	3	0.039
Dog race betting*	R 18 (1.8) NR 957 (98.2)	5 (41.7) 110 (13.6)	1 (8.3) 237 (29.3)	5 (41.7) 264 (32.6)	1 (8.3) 199 (24.6)	8.22	3	0.025
Bingo	R 17 (1.7) NR 958 (98.3)	5 (35.7) 110 (13.6)	5 (35.7) 233 (28.8)	3 (21.4) 266 (32.9)	1 (7.1) 199 (24.6)	6.36	3	0.072
Fruit machines**	R 15 (1.5) NR 960 (98.5)	6 (50.0) 109 (13.5)	5 (41.7) 233 (28.8)	1 (8.3) 268 (33.1)	0 (0) 200 (24.3)	13.99	3	$p < 0.001$
Roulette**	R 11 (1.1) NR 964 (98.9)	8 (80.0) 107 (13.2)	0 (0) 238 (29.3)	1 (10.0) 268 (33.0)	1 (10.0) 199 (24.5)	21.27	3	$p < 0.001$
Instant win games	R 11 (1.1) NR 964 (98.9)	2 (22.2) 113 (14.0)	3 (33.3) 235 (28.9)	3 (33.3) 266 (32.7)	1 (11.1) 199 (24.5)	1.42	3	0.717

* Significant at 0.05 level (uncorrected).

** Significant at the corrected 0.00385 level (using Bonferroni corrected p value for 13 comparisons).

likely to regularly engage in multi-gambling ($X^2 = 9.20, df = 3, p = 0.027$).

A Chi-square test of independence was performed to examine the relation between regular gamblers and non-regular gamblers, and number of regular online gambling activities engaged in (Table 4). Regular online poker players were significantly less likely to participate in two or more activities online most days compared to non-regular poker play-

ers. However, for all other online gambling activities, the regular gamblers were significantly more likely to participate in two or more online activities most days compared to their non-regular counterparts.

Additionally, the regular poker players were more likely to regularly engage in multi-gambling compared to the non-regular poker players ($X^2 = 311.18, df = 1, p < 0.001$). However, the regular sports bettors and regular horse race

Table 3. The relationship between engaging in multi-gambling; number of regular online activities, gambling offline and level of gambling problem

Category	Total sample N = 822 N (%)	Problem gamblers Total N = 115 N (%)	At-risk gamblers Total N = 238 N (%)	Low-level problem gamblers Total N = 269 N (%)	Non-problem gamblers Total N = 200 N (%)	X^2	df.	p value
Engaging in multi-gambling online *								
Yes (Regular)	251 (30.6)	33 (28.7)	80 (33.6)	93 (34.6)	45 (22.6)	9.20	3	0.027
No (Not regular)	570 (69.4)	82 (71.3)	158 (66.4)	176 (65.4)	154 (77.4)			
Number of regular online activities played**								
Less than two	636 (77.6)	69 (60.0)	174 (73.1)	222 (82.5)	173 (86.5)	36.14	3	$p < 0.001$
Two or more	184 (22.4)	46 (40.0)	64 (26.9)	47 (17.5)	27 (13.5)			
Gamble offline								
No	201 (24.5)	26 (22.6)	52 (21.8)	65 (24.2)	58 (29.0)	3.34	3	0.343
Yes	621 (75.5)	89 (77.4)	186 (78.2)	204 (75.8)	142 (71.0)			

* Significant at 0.05 level (uncorrected).

** Significant at the corrected 0.0167 level (Using Bonferroni corrected p value for 3 comparisons).

Table 4. The relationship between regular gamblers and non-regular gamblers, and number of regular online gambling activities engaged in

Activity		Total sample N = 975 N (%)	More than two regular online activities Total N = 220 N (%)	Less than two regular online activities Total N = 755 N (%)	X^2	df.	p value
Poker **	Regular	359 (36.8)	52 (23.6)	307 (40.7)	21.23	1	$p < 0.001$
	Non-regular	616 (63.2)	168 (76.4)	168 (76.4)			
Sports betting**	Regular	205 (21.0)	169 (76.8)	36 (4.8)	532.60	1	$p < 0.001$
	Non-regular	770 (79.0)	51 (23.2)	719 (95.2)			
Horse race betting**	Regular	116 (11.9)	83 (37.7)	33 (4.4)	180.84	1	$p < 0.001$
	Non-regular	859 (88.1)	137 (62.3)	722 (95.6)			
Betting exchange**	Regular	94 (9.6)	92 (41.8)	2 (0.3)	337.66	1	$p < 0.001$
	Non-regular	881 (90.4)	128 (58.2)	753 (99.7)			
Spread betting**	Regular	87 (8.9)	85 (38.6)	2 (0.3)	308.65	1	$p < 0.001$
	Non-regular	888 (91.1)	135 (61.4)	753 (99.7)			
Lottery**	Regular	28 (2.9)	23 (10.5)	5 (0.7)	58.57	1	$p < 0.001$
	Non-regular	947 (97.1)	197 (89.5)	750 (99.3)			
Football pools**	Regular	21 (2.2)	15 (6.8)	6 (0.8)	29.33	1	$p < 0.001$
	Non-regular	954 (97.8)	205 (93.2)	749 (99.2)			
Blackjack**	Regular	19 (1.9)	13 (5.9)	6 (0.8)	23.32	1	$p < 0.001$
	Non-regular	956 (98.1)	207 (94.1)	749 (99.2)			
Dog race betting**	Regular	18 (1.8)	17 (7.7)	1 (0.1)	54.23	1	$p < 0.001$
	Non-regular	957 (98.2)	203 (92.3)	754 (99.9)			
Bingo**	Regular	17 (1.7)	11 (5.0)	6 (0.8)	17.59	1	$p < 0.001$
	Non-regular	958 (98.3)	209 (95.0)	749 (99.2)			
Fruit machines**	Regular	15 (1.5)	9 (4.1)	6 (0.8)	12.22	1	$p < 0.001$
	Non-regular	960 (98.5)	211 (95.9)	749 (99.2)			
Roulette**	Regular	11 (1.1)	9 (4.1)	2 (0.3)	22.36	1	$p < 0.001$
	Non-regular	964 (98.9)	211 (95.9)	753 (99.7)			
Instant win games**	Regular	11 (1.1)	10 (4.5)	1 (0.1)	29.74	1	$p < 0.001$
	Non-regular	964 (98.9)	210 (95.5)	754 (99.9)			

* Significant at 0.05 level (uncorrected).

** Significant at the corrected 0.00385 level (using Bonferroni corrected p value for 13 comparisons).

bettors were significantly less likely to regularly engage in multi-gambling compared to the non-regular sports bettors ($X^2 = 18.86$, $df = 1$, $p < 0.001$) and non-regular horse race bettors ($X^2 = 18.086$, $df = 1$, $p < 0.001$).

Reasons for gambling online among regular and non-regular gamblers

A Chi-square test of independence was performed to examine the relationship between regular online poker players and non-regular online poker players; regular sports bettors and non-regular sports bettors, and regular horse-race bettors and non-regular horse race bettors in terms of reasons for gambling online. These activities were analysed in more detail as they were the most popular activities engaged in among the sample. The results are shown in Table 5.

Compared to non-regular online poker players, regular online poker players were significantly more likely to use the internet because of the availability, accessibility, comfort, because offline venues are too far, high speed of play, bet at own pace, the variety of games, the greater flexibility in stake size, multi-gambling opportunities, the free practice games, the free bets, to win money, because it is enjoyable, for the competition, for the stimulation, and for the challenge, but were significantly less likely to gamble online to bet in-play.

Compared to non-regular online sports bettors, regular online sports bettors were significantly more likely to use the internet for convenience, availability, accessibility, better value for money, and to bet in-play, but were significantly less likely to use the internet for the high speed of play, multi-gambling and the free practice games.

Compared to non-regular online horse-race bettors, regular online horse race bettors were significantly more likely to use the internet to gamble for the comfort, better value for money, and to bet in-play, but were significantly less likely to use the internet for the high speed of play, bet at own pace, multi-gambling opportunities, free practice games and boredom.

DISCUSSION

The aim of this study was to examine the participation in online gambling activities and the relationship with problem gambling behaviour among an international sample of online gamblers. A particular emphasis was among the relationship of different gambling activities and number of gambling activities on problem gambling. The majority of the participants were male, and females were significantly younger than males. The high percentage of problem gamblers (43% problem and at risk problem gamblers) could be considered surprising considering the prevalence of problem gambling among the general population is thought to be around 2–5% (Wardle et al., 2011), but the survey was posted online and it is likely that the most heavily involved gamblers may be more inclined to use online gambling forums and more likely to have come across the survey. Among the total sample the most popular online activity was poker, followed by sports betting and horse race betting. This was the same for the problem gamblers. Furthermore, three-quarters of the sample also gambled offline but nearly two-thirds of these gambled more frequently online and only one-quarter gambled less frequently online compared to

offline gambling. Whether a person gambled offline or not was not an indicator of online problem gambling. Our study did not have a comparison group of offline gamblers, so although respondents were asked about their offline gambling behaviour, it was not possible to draw conclusions between online and offline gamblers. This was not the aim in the present study, however, in a previous study comparing online and offline gamblers, Wood and Williams (2011) found that online gamblers are three to four times more likely to have a gambling problem compared to offline gamblers (Wood & Williams, 2011). It is clear that a comparison between online and offline gamblers is a necessary avenue for further research.

The online activities most commonly associated with problem gambling were poker, spread betting, fruit (slot) machines and roulette. The activities horse race betting, dog-race betting, blackjack, sports betting were also associated with problem gambling using an uncorrected significance level of 0.05. Interestingly, regular poker players were significantly less likely to be problem gamblers compared to non-regular poker players; while all other regular players (of the activities associated with problem gambling) were significantly more likely to be problem gamblers compared to their non-regular counterparts. One study by Currie et al. (2006) found that people gambling frequently (i.e., exceeding two to three days per month) were thirteen times more likely to experience gambling-related harm compared to individuals who gambled below this limit, thus supporting the finding here that regular gamblers (with the exception of regular poker players) are more likely to be problem gamblers than non-regular players. The fact that regular poker players are less likely to be problem gamblers than non-regular poker players could be because those that participate in poker frequently do so for different reasons than those that gamble on other activities frequently (i.e. to make money, or to make a living, rather than for entertainment). This is supported by McCormack and Griffiths (2012b) who found professional poker players, compared to recreational poker players, treated their playing as work, were more logical and controlled in their behaviour, took fewer risks, and were less likely to chase losses. Given the qualitative nature of this study, the results may not be generalizable, but it does offer an explanation for the findings in relation to poker in this sample.

There is some research to suggest that once an individual with problem gambling engages in a particular gambling activity, they tend to be specific in their gambling activity rather than play a wide variety of games (Grant & Kim 2001; Teo, Mythily, Anantha & Winslow, 2007). However, the results of this study suggest that problem gamblers are more likely to engage in two or more activities regularly than non-problem gamblers. This may be because online gamblers can easily access a wide range of gambling activities, whereas offline problem gamblers may only have access to a particular gambling activity at any one time. Furthermore, a recent study of online gambling behaviour (Wood & Williams, 2009) also found that problem online gamblers were significantly more likely to gamble on a greater number of gambling activities than non-problem online gamblers. Interestingly, those that played poker regularly were significantly more likely to just focus on poker than non-regular poker players. Perhaps it might be the case that offline problem gamblers are more likely to participate in only one activity, whereas online problem gamblers will participate in two

Table 5. Reasons for gambling online, among regular and non-regular poker players, sports bettors and horse-race bettors

	Regular poker player (n = 930) N (%)			Regular sports better (n = 930) N (%)			Regular horse race better (n = 912) N (%)			
	Yes	No	χ^2 p value	Yes	No	χ^2 p value	Yes	No	χ^2 p value	
Convenience	282 (81.0)	466 (80.1)	0.13	180 (91.8)	568 (77.4)	20.53**	99 (90.0)	649 (79.1)	7.26*	0.007
Anonymity	79 (22.7)	124 (21.3)	0.25	56 (28.6)	147 (20.0)	6.62*	22 (20.0)	181 (22.1)	0.24	0.621
Availability	268 (77.0)	279 (47.9)	76.00**	144 (73.5)	403 (54.9)	22.01**	63 (57.3)	484 (59.0)	0.12	0.726
Access	270 (77.6)	351 (60.3)	29.30**	161 (82.1)	460 (62.7)	26.44**	81 (73.6)	540 (65.9)	2.65	0.104
Comfort	273 (78.4)	327 (56.2)	47.15**	142 (72.4)	458 (62.4)	6.83*	85 (77.3)	515 (62.8)	8.87**	0.003
Offline venues too far	129 (37.1)	96 (16.5)	50.26**	47 (24.0)	178 (24.3)	0.01	18 (16.4)	207 (25.2)	4.17*	0.041
Dislike atmosphere										
in offline venues	31 (8.9)	49 (8.4)	0.07	19 (9.7)	61 (8.3)	0.38	13 (11.8)	67 (8.2)	1.64	0.200
High speed of play online	194 (55.7)	65 (11.2)	215.39**	30 (15.3)	229 (31.2)	19.45**	9 (8.2)	250 (30.5)	24.02**	p < 0.001
Bet at own pace	130 (37.4)	143 (24.6)	17.17**	51 (26.0)	222 (30.2)	1.33	16 (14.5)	257 (31.3)	13.19**	p < 0.001
Better value	122 (35.1)	161 (27.7)	5.62*	86 (43.9)	197 (26.8)	21.21**	59 (53.6)	224 (27.3)	31.74**	p < 0.001
Safer	24 (6.9)	25 (4.3)	2.95	14 (7.1)	35 (4.8)	1.75	5 (4.5)	44 (5.4)	0.13	0.718
Advertisements	3 (0.9)	12 (2.1)	1.98	2 (1.0)	13 (1.8)	0.55	0 (0.0)	15 (1.8)	2.05	0.153
Bet in play	26 (7.5)	108 (18.6)	21.70**	73 (37.2)	61 (8.3)	105.01**	51 (46.4)	83 (10.1)	103.30**	p < 0.001
Variety of games	121 (34.8)	81 (13.9)	55.70**	47 (24.0)	155 (21.1)	0.75	15 (13.6)	187 (22.8)	4.80*	0.029
Greater flexibility										
in stake size	156 (44.8)	70 (12.0)	127.37**	34 (17.3)	192 (26.2)	6.53*	17 (15.5)	209 (25.5)	5.31*	0.021
Spend less online	69 (19.8)	76 (13.1)	7.58**	21 (10.7)	124 (16.9)	4.49*	8 (7.3)	137 (16.7)	6.56*	0.010
Multi-gambling	197 (56.6)	53 (9.1)	250.02**	31 (15.8)	219 (29.8)	15.47**	9 (8.2)	241 (29.4)	22.20**	p < 0.001
Free practice games	70 (20.1)	70 (12.0)	11.14**	13 (6.6)	127 (17.3)	13.77**	4 (3.6)	136 (16.6)	12.72**	p < 0.001
Free bets	107 (30.7)	106 (18.2)	19.25**	40 (20.4)	173 (23.6)	0.89	21 (19.1)	192 (23.4)	1.04	0.308
To win money	268 (77.0)	270 (46.4)	83.74**	128 (65.3)	410 (55.9)	5.66*	64 (58.2)	474 (57.8)	0.01	0.940
Bored	68 (19.5)	147 (25.3)	4.01*	38 (19.4)	177 (24.1)	1.94	11 (10.0)	204 (24.9)	12.08**	0.001
Enjoyment	236 (67.8)	217 (37.3)	81.25**	104 (53.1)	349 (47.5)	1.88	41 (37.3)	412 (50.2)	6.53*	0.011
Competition	61 (17.5)	12 (2.1)	72.03**	7 (3.6)	66 (9.0)	6.28*	2 (1.8)	71 (8.7)	6.27*	0.012
Escape	32 (9.2)	43 (7.4)	0.96	20 (10.2)	55 (7.5)	1.53	9 (8.2)	66 (8.0)	0.00	0.962
Influenced by others	6 (1.7)	13 (2.2)	0.28	1 (0.5)	18 (2.5)	2.92	2 (1.8)	17 (2.1)	0.03	0.859
Stimulation	101 (29.0)	91 (15.6)	23.82**	50 (25.5)	142 (19.3)	3.59	24 (21.8)	168 (20.5)	0.11	0.746
Challenge	185 (53.2)	127 (21.8)	95.85**	75 (38.3)	237 (32.3)	2.48	31 (28.2)	281 (34.3)	1.61	0.204
Other	9 (2.6)	32 (5.5)	4.38*	4 (2.0)	37 (5.0)	3.30	4 (3.6)	37 (4.5)	0.18	0.674

* Significant at 0.05 level (uncorrected).

** Significant at the corrected 0.00179 level (using Bonferroni corrected p value for 28 comparisons).

or more because it is a lot easier to do so online. This may have implications in terms of a potential rise in the number of problem online gamblers, it will become harder to regulate gambling behaviour and can easily allow problem online gamblers to disguise the number of activities they are engaging in and their problem behaviour.

It has been speculated that multi-gambling opportunities provided online may be more problematic for potential vulnerable players and may lead to problem gambling behaviour (Griffiths, 2003). The regular poker players were more likely to engage in multi-gambling compared to the non-regular poker players. However, the regular sports bettors and regular horse race bettors were significantly less likely to regularly engage in multi-gambling compared to the non-regular sports bettors and non-regular horse race bettors. Griffiths et al. (2010) found that regular poker players enjoy the ability to engage in multi-table poker games when gambling online. Multi-gambling opportunities may be more attractive to those participating in particular gambling activities, rather than problem gamblers. Future research may wish to explore patterns of multi-gambling online using techniques such as latent class analysis and assess their relationship with offline gambling and gambling problems. This technique has been successfully used in other allied disciplines, e.g. the identification of specific patterns of multiple drug use highlighted differences in relationship with harm (Smith, Farrell, Bunting, Houston & Shevlin, 2011). It could be that different patterns of online gambling activity provide higher risk for problems than others, but this is as yet unknown.

It is also important to note some of the limitations of the study. Although the sample was relatively large and diverse, the participants were self-selected so data may not reflect online gamblers in general. Whilst there was a spread of international respondents approximately 84% were from the US and UK, and this may limit the applicability to other countries. Some participants commented on the forums where the survey was placed. The poker forums seemed to generate a lot of response and there was a strong feeling that poker players did not like to be classed as gamblers in the same way as roulette players or lottery players. Many reported that there should be a separate survey for poker players, or that questions should distinguish between recreational players and those making a living from gambling. Despite these being outside the aims of the study, they may provide stimulus for future research into the perceptions of different types of online gambling behaviour. Poker players may identify themselves differently which sets them apart from other gamblers in terms of their behaviour. They see poker as a game of skill which is different to other gambling activities. Therefore, problem poker players may have different needs regarding treatment, and there may be barriers towards accessing treatment if they believe poker is a game of skill. Perhaps poker players see poker as a more respected form of gambling? But this might only be among poker players. There is clearly a need for further research on poker players, and how online poker players differ from other types of players, e.g. online 'casino' players, or sports bettors. Another possible limitation is that the term 'fruit machine' is a very British term and may not have been understood by some of the international participants. This was highlighted on one of the forums, and cultural differences in the interpretation of activities and questions could be explored.

It is also possible that the structural characteristics of the software itself might promote addictive tendencies for vulnerable individuals (Griffiths, 1999). Structural characteristics are those features of the gambling activity itself that are responsible for reinforcement and may satisfy gamblers' needs and facilitate continual and sometimes excessive gambling (e.g., event frequency, jackpot size, near miss features, etc.; Griffiths, 1999). With the advance of online gambling it has led to increased opportunities to manipulate the potentially addictive structural characteristics of gambling activities and thus increase the appeal and arousal of the games (Shaffer, 1996). Therefore, consideration of their impact on behaviour and analysis of the structural characteristics allows us to understand which characteristics might facilitate the acquisition, development and maintenance of gambling behaviour irrespective of the individual's psychological, physiological, or socioeconomic status (Parke & Griffiths, 2007).

Although the potential effect of online gambling has been speculated considerably, research on this topic is still limited and restricted to gamblers' self-reported gambling. A further difficulty for researchers examining online gambling behaviour is associated with recruiting samples of internet gamblers that are both large and representative. The majority of studies of online gambling use self-selected samples which limits the ability to generalise findings to the wider online gambling population. Nevertheless, this study has attracted more problem gamblers, and more gamblers *per se*, allowing for the possibility to explore the phenomena in more people, and thus contributes towards the developing body of research assessing specific online gambling activities.

The majority of people who gamble online also gamble offline but less frequently than online. Problem gambling is associated more with certain online gambling activities than others (e.g. poker, roulette, horse-race betting, sports betting, spread betting and slot machines). In activities associated with problem gambling, regular gambling on an activity is associated with greater levels of problem gambling (except regular poker players), and those that gamble on two or more activities are more likely to be a problem gambling. Additionally, there appear to be differences in reasons for gambling online among regular and non-regular gamblers. Therefore, understanding the determinants for the potential impacts of different online gambling activities for increasing or decreasing the likelihood of developing online gambling problems, can lead to tailored interventions and treatment measures to better treat problem gambling behaviour.

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