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## Chasing losses in online poker and casino games: Characteristics and game play of Internet gamblers at risk of disordered gambling

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### Abstract

Disordered Internet gambling is a psychological disorder that represents an important public health issue due to the increase in highly available and conveniently accessible Internet gambling sites. Chasing losses is one of the few observable markers of at-risk and problem gambling that may be used to detect early signs of disordered Internet gambling. This study examined loss chasing behaviour in a sample of Internet casino and poker players and the socio-demographic variables, irrational beliefs, and gambling behaviours associated with chasing losses. An online survey was completed by 10,838 Internet gamblers (58% male) from 96 countries. The results showed that Internet casino players had a greater tendency to report chasing losses than poker players and gamblers who reported chasing losses were more likely to hold irrational beliefs about gambling and spend more time and money gambling than those who reported that they were unaffected by previous losses. Gamblers who played for excitement and to win money were more likely to report chasing losses. This study is one of the largest ever studies of Internet gamblers and the results are highly significant as they provide insight into the characteristics and behaviours of gamblers using this mode of access.

**Key words:** Internet poker, online casino, chasing losses, disordered gambling, irrational thoughts, behavioural marker, addiction

## **1. Introduction**

Internet gambling is an increasingly popular activity now widely available given increased Internet penetration and strong marketing efforts of online gambling operators (Gainsbury et al., 2012). Although most players gamble within reasonable means at recreational levels, a small proportion of players become overly involved, spending more time and money than they can afford, and experience subsequent negative consequences (Wood and Williams, 2011; Braverman and Shaffer, 2012; Gainsbury, Russell, Hing et al., 2013). These players are referred to as problem gamblers, and are characterised by difficulties limiting their gambling behaviour, disruption to important relationships and other activities, and preoccupation with gambling. Disordered gambling and the less specific problem gambling (a term generally used for individuals experiencing significant harms but have not been clinically diagnosed as disordered gamblers) is a serious public health issue that is receiving increasing attention internationally (Gainsbury, Blankers et al., 2013).

Disordered gambling is a recognised psychological disorder classified as a behavioural addiction (American Psychiatric Association, 2013). Prevalence rates of problem gambling have been relatively stable over the past few decades, with approximately 0.5-1.5% of adults having significant gambling problems and a further 1.5-2.0% experiencing milder difficulties (Stucki and Rihs-Middel, 2007; Productivity Commission, 2010; Wardle, Moody, Spence et al., 2011). Internet gambling has been argued to represent a particular risk to individuals vulnerable to experience gambling problems due to its ease of accessibility and the immersive, private environment that enables gambling on multiple forms with rapid continuously play (Wood and Williams, 2011). Several studies have found substantially higher rates of disordered and problem gambling among samples of Internet as compared to land-based gamblers (Griffiths et al., 2009; Binde, 2011; Wood and Williams, 2011).

One of the symptoms and diagnostic criteria associated with disordered gambling is chasing losses, that is, betting more money after losses in an attempt to 'win back' funds (American Psychiatric Association, 2013). Chasing losses is theorised to reflect an underlying preoccupation with gambling and a misunderstanding of how gambling outcomes are determined and irrational beliefs about the likelihood of winning (Svetieva and Walker, 2008; Griffiths and Whitty, 2010). Gambling is based on a house edge, making it unlikely that a gambler will be successful. Therefore, continued gambling after losses in the hopes of a payout is likely to result in further losses. Theoretical models of disordered gambling posit that chasing losses is central to the initiation and continuance of gambling sessions, contributing to on-going unaffordable losses and subsequent negative consequences (Blaszczynski and Nower, 2002; Sharpe, 2002). Both irrational beliefs and chasing behaviours are commonly reported by disordered and problem gamblers, including Internet gamblers, and in particular, characterise the lowest levels of disordered gambling severity (Blaszczynski and Nower, 2002; Orford et al., 2003; Toce-Gerstein et al., 2003; Strong and Kahler, 2007; Mackay and Hodgins, 2012). Critically, chasing losses is one of the few signs and criteria for disordered gambling that is observable. Other signs of disordered gambling such as preoccupation with gambling, restless or irritability when cutting back gambling, gambling when distressed, lying about gambling, and jeopardising important relationships are generally not easily observed without contextual information.

Numerous studies indicate that chasing losses is likely a behavioural marker of problem and disordered gambling. In an evaluation of the criteria for disordered gambling, Stinchfield, Govoni, and Frisch (2005) found that chasing losses was a reasonably strong discriminator of

disordered gambling. Similarly, in a large study of 6,682 land-based and Internet gamblers, Gainsbury, Russell, Hing, Wood and Blaszczynski (2013) found that problem gamblers were more likely to report chasing losses than moderate risk gamblers. However, other factors, including gambling behaviour and socio-demographic variables may mediate the relationship between chasing losses and problem gambling severity. In a US study, Strong and Kahler (2007) found that younger gamblers were more likely to report chasing losses at lower levels of disordered gambling severity than older gamblers. The prevalence of endorsing chasing among subclinical and problem gamblers was 27.1% and 80.9% respectively for younger gamblers and 15.0% and 78.7% respectively for older gamblers, respectively. Other known predictors of disordered Internet gambling that may influence the likelihood of chasing losses include being male, lower socioeconomic status, lower education levels, being unemployed, having a greater number of gambling-related irrational beliefs, gambling on a greater number of activities, higher gambling expenditure, longer sessions and more frequent gambling (Hopley and Nicki, 2010; Wardle, Moody, Griffiths et al., 2011; Wood and Williams, 2011; Gainsbury, Russell, Hing et al., 2013; McCormack et al., 2013).

This study aimed to examine loss chasing behaviour in a sample of Internet gamblers and how chasing losses was associated with socio-demographic variables, irrational beliefs and game play behaviours. The objective was to investigate whether the characteristics of Internet gamblers who chase losses are similar to profiles of disordered gamblers found in previous studies, including non-Internet gamblers. Similarity between profiles of these groups would provide some support for the use of chasing losses as a behavioural marker to identify Internet gamblers as potentially at-risk for gambling problems. These results would then add to the knowledge of the characteristics and game play behaviours that are associated with risky Internet gambling. Previously published analyses of the data used for this current paper found that chasing losses was associated with several known predictors of disordered gambling, including reports that responsible gambling tools would be useful, having a dispute with an online gambling operator, and suspecting players and sites of cheating (Gainsbury, Parke et al., 2013). The current paper aims to expand these findings by investigating the specific demographic and game play factors related to chasing losses in a large sample of Internet gamblers.

Research with land-based gamblers has found that poker players and casino gamblers differ on measures of novelty seeking and gambling problems (Goudriaan et al., 2009; Welte et al., 2009). However, few studies have directly compared Internet poker and casino players including their likelihood of chasing losses. Internet poker has been argued to be a less risky form of gambling than online casino games as there is an element of skill involved in poker and players are less likely to dissociate, but play socially or competitive as compared to rapid and continuous casino games (Department of Broadband, Communications and the Digital Economy (DBCDE), 2013). However, several studies have found sub-groups of more involved online poker players who do not play in a disciplined and rational manner and may chase their losses, and studies have found that the effects of change largely outweigh any skill component (Shead et al., 2008; Bjerg, 2010; Meyer et al., 2012). Many studies combine samples of Internet gamblers, despite the heterogeneity of this population (Wardle, Moody, Griffiths et al., 2011). Therefore, in the current study Internet casino and poker players were analysed separately in this study to determine whether the variables associated with chasing losses differed between online gamblers based on their use of gambling activities.

## **2. Method**

### **2.1 Procedure**

Data were collected using an online data collection tool between August and December 2006. Evidence suggests that online surveys generate data that is as equally valid as face-to-face or telephone surveys as they are less subject to social desirability bias, which is particularly important when discussing potentially sensitive issues such as online gambling which is illegal in some jurisdictions (Wood and Williams, 2007). Furthermore, since the target population were Internet gamblers, this mode of recruitment was considered appropriate. Recruitment advertisements were placed on over 100 Internet casino and poker sites and reputable portals (i.e., information and news sites), which upon request agreed to host these links, and the research was promoted via the media. Advertisements encouraged individuals who had played Internet poker or casino games in the previous three months to click through to the online survey. Participants were not offered any incentives or asked to provide any identifying personal information. The home page of the survey included a description of the study, requirements for participation and an informed consent preamble. A cookie was used to ensure that only one response could be given per ISP address. The research was granted ethical approval from a University Ethics Committee.

## 2.2 Measures

The online survey included 85 closed and open-ended questions, all questions were optional and subsequently not all respondents answered each question. The questions analysed in this manuscript were:

- a) *Socio-demographic and gambling variables*: Five questions to measure age, gender, occupation (options to select either a specific industry or 'student', 'unemployed', 'retired', or 'full time parent'), and country of residence. One question asked respondents to indicate which types of online gambling they regularly participated in (multiple responses allowed).
- b) *Chasing behaviour*: One question asked 'If you lose when gambling online are you more likely or less likely to keep playing to try and win some money back?' Fixed forced-choice response options were: 'less likely'; 'more likely'; 'I would be unaffected by what was lost on previous gambles'.
- c) *Internet casino use*: All participants who affirmed that they play at online casinos (not including poker) were asked further questions including: frequency of playing (8 response options ranging from '2-3 times per day' to 'annually'); initiation of online casino playing (8 response options ranging from 'less than 3 months ago' to 'more than 5 years ago'; average session length (9 response options ranging from 'less than 15 minutes' to 'more than 12 hours'); typical wager per session (10 response options ranging from 'less than \$10' to 'more than \$5000'); and the extent to which participants played online casinos for excitement, relaxation, to win money, (5 response options for each motive ranging from 'never' to 'always').
- d) *Internet poker use*: The same questions for Internet casino user were asked about poker use for all participants who affirmed that they play online poker. Poker players were not asked about their typical wager per session, rather they were asked about typical blind levels (11 response options ranging from '\$.10/.20' to 'Greater than \$100/\$200'). Two additional questions asked about the type of poker typically played (five response options: 'mainly a cash game player', 'mainly a tournament player', 'a player that plays both cash games and tournament games', 'mainly a freeroll player', 'mainly a "play-fo-free" player;), and perceived poker skill level (7 response options ranging from 'extremely weak' to 'extremely good').
- e) *Bias in betting behaviour*: One fixed-choice question asked participants to choose the response which best reflected their betting behaviour. Three response options were provided to reflect commonly held biases/irrational beliefs: 'If had a recent run of

winning bets, I would continue betting knowing that I am having a lucky streak and will probably continue winning’ (the Hot Hand); ‘If had a recent run of losing bets, I would continue betting knowing that I am due some wins soon’ (the Gambler’s Fallacy); and: ‘Past betting events would not affect my future betting behaviour’ (no bias).

### 2.3 Statistical analysis

Respondents were categorized in terms of their reported likelihood of gambling following losses (more likely to bet, less likely to bet and unaffected). In the first statistical analysis, we considered all respondents. We controlled for several demographic characteristics, and if a gambler was solely a Internet casino or poker player. In the second analysis, we studied Internet casino and poker players as separate groups because they responded to slightly different questions.

As the analysis method, we employed probit estimation because the independent variable was a binary variable. The dependent variable in the regression model was chasing which took either the value 1 (=“more likely to chase previous losses”) or 0 (=otherwise). This method allowed us to detect specific demographic characteristics and behavioural factors that may predict reported chasing behaviour. Since the estimation procedure was nonlinear, we reported marginal effects from the variables of interest. Independent variables showed which demographic background variables, biases/perceptions and game modes were related to/predicted reported chasing behaviour. All findings reported as statistically significant had at least  $p < .05$ .

## 3. Results

### 3.1 Participants

A total of 10,838 participants (58% male) from 96 different countries took part in the study. This sample included: 7,342 Internet casino players (45.2 % male), mostly (75.5%) aged over 35 years; and 5,461 poker players (74.5% male), 60.9% aged over 35 years. These samples are not mutually exclusive as 2,723 participants (25.1%) reported playing at both Internet casino and poker sites in the three months preceding the survey. A vast majority of participants resided in North America or the United Kingdom. A brief summary of the key participant information is reported in Table 1.

**Table 1.** Demographic characteristics of participants (N=10,838)

		Internet Casino (n = 7,342)	Internet Poker (n = 5,461)
<i>Gender</i>	Males (%)	45.2	74.5
	Females (%)	54.8	25.5
<i>Age</i>	under 18 (%)	0.1	0.2
	18-25 (%)	5.4	12.0
	26-35 (%)	19.0	26.9
	36-45 (%)	26.4	25.4
	46-55 (%)	29.5	20.8
	56-65 (%)	15.4	11.0
	Over 65 (%)	4.2	3.7
<i>Country of residence</i>	USA (%)	68.1	55.3

	Canada (%)	7.8	9.1
	UK (%)	5.9	13.2
	Australia (%)	1.8	2.3
	Other (%)	16.4	20.1

Note: Participants could play both casino games and poker games, and therefore the total sums of observations for casino games and poker games are higher than the total number of participants.

### 3.2 Chasing behaviour for all respondents

Approximately one-third of all participants (32.4 %, n=3,347) reported being less likely to bet following losses, a smaller proportion reported being more likely to bet following losses (chase losses) (28.5%, n=3,015), and the majority of participants reported being unaffected by previous losses (37.8 %, n= 3,863). A probit regression analysis was used to test which variables were statistically significant factors determining the likelihood of chasing losses. Table 2 reports probit estimates for all respondent demographic characteristics, the game mode preferences, and likely behaviour following a series of wins/losses reflecting irrational beliefs. The dependent variable is equal to 1 for the participants that are more likely to chase losses and equal to 0 for the participants that are unaffected or less likely to chase previous losses.

Of the demographic variables, being female increased the probability of chasing losses by 4.1% and the likelihood of chasing decreased by 1.1% with each older age cohort. Being unemployed increased the probability of chasing by 5.3% and being a student increased the probability by 8.3%. The other demographic background variables had no statistically significant impact on the likelihood of chasing losses. In terms of gambling behaviour, playing only casino games increased the probability of chasing by 4.1% while playing only poker lowered the probability of chasing by 10.4%. Biased perceptions of how outcomes are determined appeared to be related to reported loss chasing. A belief in the Gambler's Fallacy increased the probability of chasing by 39.4% and the Hot Hand bias increased the probability of chasing by 14%.

**Table 2.** Probit regression results of demographic background variables, Player game preferences and beliefs for all participants (N=10,838)

Independent Variable	P(y = More likely chase previous losses)		
	dy/dx	z-value	p-value
<i>Demographic Variables</i>			
Gender (1 = female)	0.041	3.16	0.002
Age	-0.011	-2.09	0.036
Unemployed	0.053	1.96	0.050
Student	0.083	2.59	0.009
Full-time Parent	0.029	0.84	0.399
Retired	0.003	0.17	0.867
United States	-0.030	-1.75	0.080
UK	-0.002	-0.11	0.915
Sweden	0.027	0.52	0.606
Denmark	-0.031	-0.58	0.559

Australia	-0.004	-0.09	0.927
Canada	-0.001	-0.04	0.971
Germany	-0.061	-1.19	0.235
The Netherlands	0.007	0.12	0.902
<i>Gambling mode</i>			
Play only Casino	0.041	3.05	0.002
Play only Poker	-0.104	-5.74	0.000
Slot	0.028	1.65	0.099
Roulette	0.019	0.87	0.384
Black Jack	-0.013	-0.88	0.381
Betting	-0.023	-1.15	0.251
<i>Perception of series of wins/losses</i>			
Gambler's Fallacy	0.394	24.77	0.000
Hot Hand	0.140	10.08	0.000
No. Obs	7480		
Pseudo R2	0.128		
Notes: 1) Probit estimates are marginal effects evaluated at the mean of observed variables. 2) Reported countries had about 50 observations available.			

### 3.3 Chasing behaviour for casino and poker players

Table 3 reports the findings from probit estimation detailing how the demographic, gambling behaviour, motives for playing online casino and poker, and reported biases were related to self-reported chasing behaviour. Among Internet casino players, being female increased the probability of chasing by 6.3% and the likelihood of chasing decreased by 1.5% with each older age cohort. Among Internet poker players, being female increased the probability of chasing by 11.7% and the likelihood of chasing decreased by 1.5% with each older age cohort.

**Table 3.** Probit regression results of demographic background variables, Player game preferences and beliefs for Internet poker and Internet casino players (N=10,838)

Independent Variable	P(y = More likely chase previous losses)						
	Casino			Poker			
Game type	dy/dx	z-value	p-value	dy/dx	z-value	p-value	
Demographic Variables							
Gender (1 = female)	0.063	4.11	0.000	0.117	6.12	0.000	
Age	-0.015	-2.24	0.025	-	0.015	-2.42	0.015
Unemployed	0.051	1.47	0.142	0.112	2.80	0.005	
Student	0.071	1.33	0.183	0.073	2.14	0.033	
Player behaviour							
Start playing	0.005	1.37	0.171	0.004	0.91	0.365	
Wagering level/blind level	0.016	4.29	0.000	0.017	4.67	0.000	
Session length	0.020	3.79	0.000	-	0.003	-0.56	0.575
Frequency of playing	0.022	4.60	0.000	-	0.008	-1.79	0.073
Mainly cash player (only poker players)	.	.	.	0.038	2.07	0.039	
Mainly tournament player (only poker players)	.	.	.	-	0.026	-1.53	0.126
Skill level (only poker players)	.	.	.	-	0.019	-2.34	0.019
Motives for playing							
Excitement	0.040	4.80	0.000	0.031	4.05	0.000	
Relax	-0.029	-3.85	0.000	-	0.014	-2.04	0.042
Win money	0.037	4.77	0.000	0.022	3.01	0.003	
Perception of series of wins/losses							
Gambler's Fallacy	0.386	21.32	0.000	0.390	14.48	0.000	
Hot Hand	0.114	6.51	0.000	0.176	8.60	0.000	
No. Obs	4714			3414			
Pseudo R2	0.118			0.139			

Note: Probit estimates are marginal effects evaluated at the mean of observed

variables.

Higher bet levels increased the probability of chasing by 1.6% for Internet casino players and 1.7% for Internet poker players. The likelihood of chasing increased by 2% with each longer session cohort and by 2.2% with each higher frequency cohort for Internet casino players. Playing for excitement increased the probability of chasing by 4% for Internet casino players and 3.1% for Internet poker players, and playing to win money increased the probability of chasing by 3.7% for casino and 2.2% for poker players. Playing for relaxation decreases the probability of chasing by 2.9% for casino players and 1.4% for poker players. A belief in the Gambler's Fallacy increased the probability of chasing for both casino and poker players by 38.6% and 39% respectively. Similarly, a belief in the Hot Hand bias increased the probability of chasing by 11.4 % for casino and 17.6% for poker players.

#### 4. Discussion

The majority of Internet gamblers reported that experiencing losses had no impact on their immediate gambling behaviour. This result is consistent with research indicating that the majority of Internet gamblers engage in this activity in a reasonable manner, stay within their limits and do not experience subsequent harms (Wood and Williams, 2011; Braverman and Shaffer, 2012; Gainsbury, Russell, Hing et al., 2012). However, more than one in four participants reported that they would likely chase their losses, which is a known marker of disordered gambling due to its propensity to lead to further losses (Griffiths and Whitty, 2010; Svetieva and Walker, 2008). These results are consistent with previous research indicating the Internet gamblers are vulnerable to experiencing gambling problems (Griffiths et al., 2009; Wardle, Moody, Griffiths et al., 2011a; Wood and Williams, 2011).

Participants who reported that they would be likely to engage in chasing behaviours were also more likely to endorse irrational beliefs about gambling wins. Specifically, players who believed that they were due for a win following a series of losses (the Gambler's Fallacy) were much more likely to continue betting after losses, which is consistent with this behaviour. Players who believed in lucky streaks (the Hot Hand) were also more likely to chase losses, albeit to a lesser extent. This may represent a tendency to persist within gambling sessions as a result of both wins and losses. Irrational beliefs, such as these, have been found to be related to risky and disordered Internet gambling (Bjerg, 2010; Gainsbury et al., 2012; Mackay and Hodgins, 2012). More research is needed to investigate the impact of a wider range of irrational beliefs on chasing losses. Nonetheless, as the patterns of irrational beliefs and game play held by loss chasers are similar to those of disordered gamblers, this suggests that chasing behaviour may be a marker of disordered gambling.

Internet poker players were less likely to report typically chasing losses than Internet casino players. This is consistent with claims that Internet poker is less likely to be associated with problems than other types of Internet gambling as the outcome is determined by a combination of random events and the player's intentional strategic moves and betting is typically not continuous or fast paced (Bjerg, 2010; Clement et al., 2012; Gainsbury, 2010; DBCDE, 2013). As poker is played in discrete rounds, each game is easily discernible to players, as is the influence of the cards and the strategies used by both the player and their opponents. These factors may reduce the likelihood of poker players chasing losses by reducing the misperception that the outcomes of one game may affect a subsequent hand.

In terms of demographic characteristics, female Internet gamblers were more likely to report chasing losses and this effect was apparent among female Internet casino and poker players.

Previous studies of Internet and land-based gamblers have found no gender differences among problem gamblers (Gainsbury, Russell, Hing et al., 2013) or that males are more likely to have problems (McCormack et al., 2013; Wardle, Moody, Spence et al., 2011; Wood and Williams, 2011). However, recent reports suggest that an increasing number of women are seeking help for gambling problems, including Internet gambling (GamCare, 2010; Holdsworth et al., 2012). There is some evidence that women are gambling online as this is perceived to be a safe, non-intimidating environment and gambling sites are directly targeting women, which may lead to further increases in disordered gambling among this cohort (Abarbanel and Bernhard, 2012; Corney and Davis, 2010). It is important for future research to include sufficient numbers of women to investigate Internet gambling as well as a measure of gambling problems to determine levels of harm among this population.

Younger people were more likely to report chasing losses than older gamblers. These results are consistent with previous research (Strong and Kahler, 2007). The relationship between younger adults and chasing losses also may support previous findings that young people who gamble on the Internet have an elevated risk for gambling problems, and that this age cohort is at greatest risk for developing gambling problems (Gainsbury et al., 2012; Griffiths et al., 2009; McBride and Derevensky, 2012; Productivity Commission, 2010; Reith, 2006; Shaffer and Korn, 2002). Our results support age restrictions for Internet gambling to reduce potentially problematic gambling amongst a vulnerable population (Gainsbury, Blankers et al., 2013). The relationship between chasing losses and unemployment has not been widely found in the literature, although being unemployed is a known predictor of having gambling problems (Reith, 2006). Previous studies have also found that being a student is predictive of being a problem Internet gambler (Gainsbury et al., 2012). It is possible that being unemployed or a student was correlated with age, and further research is needed to understand these relationships.

Greater gambling involvement in terms of bet size and session length was associated with chasing losses for both Internet poker and casino players. Disordered Internet gambling has also previously been associated with greater gambling losses, more frequent gambling, and longer sessions of play (McBride and Derevensky, 2009; Hopley and Nicki, 2010; Wood and Williams, 2011; Braverman and Shaffer, 2012; Gainsbury et al., 2012; Gray et al., 2012; McCormack et al., 2013). Notably, in the current study longer and more frequent poker sessions were not associated with chasing losses, which is consistent with the suggestion that this gambling activity may be less problematic for players (DBCDE, 2013). Alternatively, as the element of skill is more pronounced in poker over longer periods of time (Meyer et al., 2012), poker players who engage in this activity more regularly may be more disciplined and less likely to chase losses.

Playing for excitement was more common among both Internet casino and poker players who chased their losses, although winning money was also an important motivator for these groups. In contrast, playing for relaxation appeared to be a protective factor for both Internet casino and poker players. A study of 179 Internet poker players found that impulsivity, dissociation, boredom proneness and negative affective states were predictive of disordered gambling (Hopley and Nicki, 2010). It is possible that playing for excitement correlates with some of these motivations, such as impulsivity and boredom proneness. The motivation for loss chasers to win money is consistent with the results of a study of 2,799 Internet gamblers which found that problem gamblers were more likely to be influenced by incentives such as free and bonus credits and had greater irrational beliefs about gambling than non-problem gamblers (Gainsbury, Russell, Hing et al., 2013). Few studies have examined motivations for

gambling among problem Internet gamblers, but these results suggest that this could be a relevant factor in predicting problematic play.

#### **4.1 Limitations and implications**

The data were obtained in 2006 and as Internet gambling has become more legitimate and mainstream in many jurisdictions during this time, despite the large sample size, the responses of the participants may not be representative of all Internet gamblers today. As with most Internet surveys, participation was based on self-selection and therefore, the participants are not expected to be representative of all Internet casino and poker players. Furthermore, as with any retrospective questionnaire, there are some limitations in the bias inherent in self-perception and self-report. Although many variables of interest were measured, no measure of problem gambling was included. Participants could endorse either the Hot Hand or Gambler's Fallacy, not both, which limited the extent to which these biases could be explored. Chasing losses was measured with only a single question and was based on self-report, which limits the reliability and validity of this variable. Nonetheless, this is the largest survey to date of Internet gamblers, and even gender distribution, broad age range and number of countries represented means that the sample is more representative than many previously completed studies on Internet gambling, which are often limited to university-recruited students or one particular gambling site (Gainsbury, Russell, and Blaszczynski, 2013). Therefore, despite these limitations, this study contributes to scarce knowledge about Internet gambling and provides valuable insight into playing patterns and the relationship between online gambling and markers of problem gambling, which has important clinical and research implications.

Over the past few years efforts have been made to design intelligent detection systems to identify markers of risky and disordered gambling using algorithms that analyse player behaviours and interactions (Dragicevic et al., 2011; Gainsbury, 2011; Auer and Griffiths, 2012; Braverman and Shaffer, 2012; Adami et al., 2013). These systems can be used to trigger warning signs for players or notify operators to check in with players in an attempt to minimise harms and prevent gamblers developing serious problems (Gainsbury, 2011; Haefeli et al., 2011). Chasing losses is one of the few observable markers of Internet problem or disordered gambling behaviour (Gainsbury, 2011). Furthermore, chasing losses can be observed within a single session of play, meaning that this behaviour can be measured for individual gamblers without necessitating tracking a single player over time or on different gambling activities or in gambling venues. Future research should include analyses of online player behaviour in combination with a measure of problem gambling to confirm the relationship between chasing losses and disordered gambling and the extent to which this behaviour marker can be used to prevent the development of subsequent harms.

#### **4.2 Conclusions**

The results of the survey of Internet gamblers found that the characteristics of Internet gamblers who were more likely to chase their losses had many similarities with problem and disordered Internet gamblers. Internet gamblers who played casino games and younger players were more likely to chase losses, which is consistent with research that indicates rapid, continuous forms of gambling are more likely to enable risky gambling, and young people are particularly vulnerable to developing gambling problems. Gamblers who chased losses were more likely to spend more time and money gambling, to gamble in order to win money and hold irrational beliefs about gambling. However, unlike previous studies, women were more likely to chase losses, which may indicate that women are at greater risk of developing Internet gambling problems than previously realised. As the current study did not

measure gambling problems, the results must be interpreted with caution. However, the results make an important contribution to the literature on Internet gambling and excessive and disordered Internet use more generally. If chasing losses indicates risky or problematic Internet gambling, further efforts are required to identify these behaviours and implement strategies to encourage gamblers to stay within their affordable limits, or cease gambling where appropriate.

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