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*PSYCHOLOGY OF ADDICTIVE BEHAVIORS*

# The impact of Internet gambling on gambling problems: A comparison of moderate-risk and problem Internet and non-Internet gamblers

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# The impact of Internet gambling on gambling problems: A comparison of moderate-risk and problem Internet and non-Internet gamblers


## Abstract

Numerous studies have reported higher rates of gambling problems amongst Internet as compared to non-Internet gamblers. However, little research has examined those at-risk of developing gambling problems or overall gambling involvement. This study aimed to examine differences between problem and moderate-risk gamblers amongst Internet and non-Internet gamblers to determine the mechanisms for how Internet gambling may contribute to gambling problems. Australian gamblers (N=6,682) completed an online survey that included measures of gambling participation, problem gambling severity, and help-seeking. Compared to non-Internet gamblers, Internet gamblers were younger, engaged in a greater number of gambling activities, and were more likely to bet on sports. These differences were significantly greater for problem than moderate-risk gamblers. Non-Internet gamblers were more likely to gamble on electronic gaming machines, and a significantly higher proportion of problem gamblers participated in this gambling activity. Non-Internet gamblers were more likely to report health and psychological impacts of problem gambling and having sought help for gambling problems. Internet gamblers who experience gambling-related harms appear to represent a somewhat different group from non-Internet problem and moderate-risk gamblers. This has implications for the development of treatment and prevention programs, which are often based on research that does not cater for differences between sub-groups of gamblers.


**Keywords:** Internet gambling, problem gambling, pathological gambling, online gambling, moderate-risk gambling, sub-groups

## Introduction

The term Internet gambling is often used interchangeably with online gambling and refers to all forms of gambling on chance events for money (including wagering and betting on skilled games) via the Internet. This includes gambling using computers, mobile phones, or wireless devices connected to the Internet. Internet gambling has grown tremendously in the past ten years, and currently represents around 8% of the global gambling market (GBGC, 2011). With strong underlying growth at 12% per annum, global Internet gross gaming yield (i.e., stakes wagered less prizes) is expected to exceed US$43 billion by 2015 (GBGC, 2011). Although 65% to 82% of adults worldwide gamble annually, participation in Internet gambling is relatively low, estimated at between 1% and 13% (Olason et al., 2009; Petry, 2006; Productivity Commission, 2010; Wardle et al., 2011; Wood & Williams, 2010). Nonetheless, as participation in Internet gambling is increasing, this study aims to advance understanding of how individuals who gamble online differ from non-Internet (land-based) gamblers, to determine the impact of Internet gambling and its contribution to the development of gambling problems.

When asked about advantages of gambling on the Internet versus gambling in land-based venues, Internet gamblers typically cite accessibility and convenient access (Gainsbury, Wood, Russell, Hing, & Blaszczynski, 2012; Griffiths & Barnes, 2008; Wood & Williams, 2010; Wood, Williams, & Lawton 2007). These findings suggest that Internet gambling is used when other venues are inaccessible, or because less time and effort are required. Privacy of online play is

considered beneficial by many players, particularly women who may experience discomfort and social pressure in land-based venues (Abarbanel & Bernhard, 2012; Corney & Davis, 2010). Moreover, Internet gambling enables greater flexibility for experimentation with small bets. Once an account is opened, Internet gambling is quite straightforward. Tutorials and practice games are often provided, and many online gambling sites and forums provide links to other types of online gambling, encouraging players to broaden their experience and repertoire of gambling activities.

Nonetheless, perceived disadvantages of Internet gambling may preclude gamblers from using this mode. Consumers may mistrust gambling websites, with even online gamblers concerned about site fairness and security (Ipsos Reid, 2005; Wood & Williams, 2010; Woodruff & Gregory, 2005). In a survey of 10,838 international Internet gamblers, over one-third of respondents reported having a dispute at some point with an operator, with fewer than half reporting successful resolutions (Gainsbury, Parke, & Suhonen, 2012). In another large scale survey, 36% of Internet gamblers (n=1,954) reported difficulty verifying the fairness of games, and 25% were concerned about safety of their funds (Wood & Williams, 2010). Furthermore, 19% stated that it was easier to spend more money online indicating the potential for players to spend more than they intended. Internet gambling may also reduce social aspects of gambling for some players (McCormack & Griffiths, 2010; Wood & Williams, 2010).

Researchers have speculated that the ongoing further legalization of gambling, the concomitant increase in gambling availability, and the promotion and widespread market penetration of new gambling forms, will lead to increased rates of problem gambling (Abbott, Volberg., & Ronnberg, 2004; Toneatto & Ladouceur, 2003; Welte, Barnes, Tidwell, & Hoffman, 2009). Lending some support to such forecasts, increases in the number of gamblers who cite Internet gambling as the most problematic form are evident. Data from gambling telephone and Internet-based support organisations show that Internet gambling is reported as the main cause of problems by 44% of callers in Sweden (Svensson & Romild, 2011), and 30% of clients in Australia (Gambling Help Online, 2012). The major UK gambling helpline reported a 14% rise in the number of female callers gambling on the Internet (to an overall proportion of 47%), compared to a rise of just 4% (to an overall proportion of 24%) amongst males (GamCare, 2010). Concurrently, the percentage of females indicating they gambled in casinos fell from 22% to 12%, suggesting that women may be increasing their online gambling at the expense of land-based play. Helpline contacts are not representative of all problem or treatment-seeking gamblers; however, increased reports of Internet-gambling related problems suggest an imperative for a greater understanding of the impact of this mode of gambling.

Numerous studies have reported higher rates of at-risk, problem and pathological gambling amongst Internet gamblers compared with non-Internet (land-based) gamblers (Brunelle et al., 2012; Griffiths, Wardle, Orford, Sproston, & Erens, 2009; Ladd & Petry, 2002; Olason et al., 2011; Wood & Williams, 2011). For example, in a survey of 12,521 international gamblers, Internet gamblers (15% of total sample) were 2.24 times more likely to be probable problem gamblers, and 3.2 times more likely to be moderate-risk gamblers, compared to non-Internet gamblers (Wood & Williams, 2011). However, evidence of the direction of causality is inconclusive, that is, whether Internet gambling causes problems or whether problem gamblers are attracted to online gambling (Wood, Williams, & Parke, 2012).

Although initial research on Internet gambling compared Internet and non-Internet gamblers (e.g., Gainsbury, Wood et al., 2012; Griffiths et al., 2009; Ladd & Petry, 2002; Olason et al., 2011; Wood & Williams, 2011), little consideration has been given to those at-risk of developing gambling problems. Furthermore, it is important to consider all forms of gambling, rather than only Internet gambling in isolation, to investigate the relationship between Internet gambling, gambling problems and how Internet gambling may be integrated more broadly with land-based gambling. A high proportion of Internet gamblers are likely to also engage in some form of land-based gambling. For example, in the 2007 UK gambling prevalence survey, overall prevalence of online gambling was 5% but the prevalence of Internet only use for gambling was 0.1% (Wardle & Griffiths, 2011). Therefore, untangling the complexity of how individuals gamble on different forms and why some develop substantial problems and others do not is important.

The current study aims to examine differences between problem and at-risk gamblers, taking into consideration use of Internet in addition to land-based gambling. Therefore, we examined overall patterns of gambling behaviour to determine the contribution of each form to gambling problems and to clarify factors associated with Internet gambling problems. The specific objectives of this research were to compare Internet and non-Internet gamblers on gambling behavioural patterns, gambling-related problems, and help-seeking behaviour between those identified as problem and moderate-risk gamblers. Given the lack of previous research, the current study was exploratory with no specific hypotheses advanced.

## Methods

### Participants

Australian adults (aged 18 years and over) who had gambled at least once in the past 12 months were the target population for this research. A sample of 6,682 respondents completed an online survey. Of these, 4,185 completed the problem gambling severity index (PGSI; Ferris & Wynne, 2001), a completion rate of 62.6%.

### Procedure

Online advertisements were used to recruit Australian gamblers to complete an online gambling survey; a recruitment method considered to optimally recruit Internet gamblers and participants across geographical regions. Online surveys increase anonymity and privacy, which is thought to increase accuracy of responses, particularly about sensitive subjects such as problem gambling and help-seeking (Shih & Fan, 2008; Wood & Williams, 2007). Although Internet compared to offline advertisements may recruit a higher proportion of computer-savvy respondents, this was necessary to remove Internet use as a potential confounding variable. Therefore, we also recruited gamblers who use the Internet, but who do not gamble online.

Banner advertisements and links to the survey were placed on numerous websites between December 2010 and June 2011. These included websites of major land-based and Internet wagering providers, land-based gambling venues, gambling help and treatment providers, state gambling regulators, and sporting organisations. From July to August 2011, advertisements based on relevant keywords were run on Facebook and Google to try to recruit a wider range of participants.

Advertisements included the logos of the two universities involved in the research and indicated participants would receive feedback on how their gambling compared with others. Participants did not receive any incentives or compensation. Participants were directed to the survey home page, outlining the inclusion criteria, informed consent preamble, purpose of the survey, and voluntary nature of participation. No personal identifying details were collected, and participants were assured of complete anonymity in subsequent publications. The home page also contained contact information for the primary researchers and human research ethics committees approving the study. Survey responses were coded such that repeat attempts to complete the survey from the same computer would be denied to avoid participants completing the survey multiple times. As no incentives were provided this was not considered a serious risk.

**Measures**

The online survey was only available in English and was adapted from an instrument used by Wood and Williams (2010). Although pilot tested and used in previous research (Wood & Williams, 2010; 2011), with the exception of the PGSI, the questions have not been psychometrically validated. For a comparison of demographic variables, attitudes, and gambling behaviour between Internet and non-Internet gamblers see Gainsbury et al. (2012). Nearly all questions were fixed-choice, although some allowed multiple options. The median survey completion time was 11 minutes, 35 seconds. The survey had five sections:

a) *Gambling Behavior Scale.* Participation in nine different gambling activities was measured, including: instant win scratch tickets, lottery tickets and keno, wagering on sporting events, wagering on dog or horse races, bingo, games of skill, poker (against individuals), electronic gaming machines (EGMs), and casino table games. Participants indicated how often they engaged in each form over the past 12 months (seven options ranging from '4 or more times a week' to 'not at all in the past 12 months'). Those who had participated at least once in each activity were asked whether they used the Internet for that form of gambling.
b) *Problem Gambling Severity Index* (Ferris & Wynne, 2001). Nine questions that comprise the Problem Gambling Severity Index (PGSI) were administered. Questions assessed the extent of gambling-related harm experienced over the previous 12 months with response options of 'never', 'sometimes', 'most of the time', and 'almost always'. Scores range from 0 to 27 and indicate the risk level of gambling problems for each participant. The PGSI has been independently validated and results indicate that it has excellent reliability, dimensionality, external/criterion validation, item variability, practicality, applicability, and comparability (McMillen & Wenzel, 2006; Neal et al., 2004). A recent review of use of the PGSI to measure problem gambling in Australian research concluded that the original and validated version is the most suitable measure to provide accurate and comparable results (Problem Gambling Research and Treatment Centre (2011).
c) *Problem Gambling Questions*. Participants were asked whether any specific gambling activities had contributed to their gambling-related problems more than others and, if so, to nominate the most problematic type (lotteries, instant win tickets, race betting, bingo, EGMs, blackjack, roulette, baccarat, poker, betting on skill games, other) and mode (Internet via computers, Internet via mobile phone, Internet via wireless device, interactive TV, land-based gaming and betting via telephone). Questions asked whether participants had sought formal and informal help for gambling problems, type of help sought (friends, family, Gambler's Anonymous, family doctor, psychologist, psychiatrist,

counselling, religious leader, telephone helpline, online support) and preferred mode for help-seeking (face-to-face, telephone, Internet). Resources for further information about problem gambling and help-seeking were made available to participants interested in these, including links to relevant treatment agencies, helplines, and informative websites.

d) *Demographics*. Standard questions assessed gender, age, marital status, education, employment, household income, and household debt.
e) *Feedback*. The online survey was interactive and provided personalised normative feedback to participants. This was to keep participants engaged and interested to encourage survey completion. Furthermore, advertising the interactive feedback was thought to assist participant recruitment. After each section, participants were presented with charts comparing their answers/scores/profiles to all other people taking the survey, based on age and gender. Two questions asked about the usefulness of the normative feedback, and whether participants expect to change their gambling behaviour as a result.

**Analysis**

Participants who indicated that they had gambled via the Internet on one or more occasions over the previous 12 months, were classified as Internet gamblers. This definition of Internet gamblers is appropriate for this study, given that even infrequent Internet gambling may have an impact on the development of harm. Furthermore, this definition is consistent with previous studies (Griffiths et al., 2009; Ladd & Petry, 2002; Olason et al., 2011; Wood & Williams, 2011), enabling comparison of results. Given that this definition is based on self-report of Internet gambling the accuracy of the classification is not perfect, as demonstrated by some participants stating they had not gambled online in the past 12 months, but also indicating that Internet gambling was the main gambling form contributing to their gambling problems. This may indicate they had responded erroneously to earlier questions, or that they had previously gambled online.

This study adopted a 2 (moderate-risk vs. possible problem gambler) x 2 (non-Internet vs. Internet gambler) between-subjects design. Two-way ANOVAs or t-tests were employed for continuous dependent variables, including contrasts to examine simple main effects. Logistic regressions were used to check interaction effects and Wald statistics have been reported. If no significant interaction effects were found, chi-square tests were used to test main effects, including examining standardized residuals for dependent variables with more than two levels, using a critical standardized residual of ±2. For all analyses, missing data were excluded on a listwise basis and *N* is reported where relevant throughout.

Due to the large sample size ($N$ = 1,814), an alpha of 0.001 was used (unless reported otherwise) and effect sizes are reported for all t-tests and chi-square analyses. For t-tests, Cohen's *d* is reported and, using Cohen's guidelines (Cohen, 1992); 0.2 indicates a small effect, 0.5 a medium effect, and 0.8 a large effect. For chi-square, the $\phi$ (phi) coefficient was used, where values between -0.3 and 0.3 may be treated as trivial associations. However, all results that are statistically significant at alpha = 0.001 with a phi coefficient between -0.3 and 0.3 are reported, but should be interpreted with caution. For ANOVA tests, eta-squared ($\eta^2$) effect sizes are reported, where 0.0099 indicates a small effect, 0.0588 a medium effect and 0.1379 a large effect (Cohen, 1988). As a conservative alpha level was used for all analyses, no further type I error control was used for simple main effect tests. All analyses were conducted using SPSS v18.0.3

on an Apple Intel MacBook Pro. To reduce the length of the results, only statistically significant results are reported unless a non-significant result is considered particularly noteworthy. Thus, if a simple main effect, main effect or interaction is not reported, it was not statistically significant.

## Results

Of the 4,185 participants who completed the PGSI, 31.8% were classified as non-problem gamblers (PGSI=0), and 24.9% were classified as low risk gamblers (PGSI=1-2). The remaining 1,814 respondents were classified as either a moderate-risk (PGSI=3-7, n=1,109, 61.1%) or possible problem gambler (PGSI=8-27, n=705, 38.9%) and formed the sample included in the analyses for this study. Of these 1,814 participants, 1,263 (69.6%) were classified as Internet gamblers and 551 (30.4%) were classified as non-Internet gamblers.

### Demographics

Most of the sample (88.4%) was male; no significant gender differences were found between moderate-risk and problem gamblers. Problem gamblers were, on average, significantly younger ($M$ = 40.21, $SD$ = 13.83) than moderate-risk gamblers ($M$ = 43.96, $SD$ = 14.52), $F(1,1810) = 20.57$, $p < 0.001$, $\eta^2=0.002$. This was particularly evident amongst the Internet gamblers, where problem Internet gamblers ($M$ = 39.19, $SD$ = 13.13) were significantly younger than moderate-risk Internet gamblers ($M$ = 43.94, $SD$ = 14.18), $F(1, 1810) = 32.47$, $p < 0.001$, $\eta^2=0.018$.

There were statistically significant differences in marital status between moderate-risk and problem gamblers, $\chi^2$ (4, $N$=1,811) = 17.58, $p = 0.001$, $\phi = 0.18$. Moderate-risk gamblers were more likely to be married (44.5% vs. 29.7%) and less likely to be never married (27.3% vs. 34.8%) compared to problem gamblers. The pattern of results for marital status was not significantly different between Internet and non-Internet gamblers.

Most of the sample was employed full-time (60.1%) or part-time (12.4%). Internet gamblers were more likely to be employed full-time than non-Internet gamblers, who were more likely to be employed part-time or be unemployed, $\chi^2$ (6, $N$=1,770) = 29.73, $p < 0.001$, $\phi = 0.13$. Standardized residuals indicated that significantly more problem gamblers than moderate-risk gamblers were unemployed and seeking work, $\chi^2$ (6, $N$=1,770) = 22.53, $p = 0.001$, $\phi = 0.11$. There were no significant differences between moderate-risk and problem gamblers for education levels, income brackets, or household debt.

### Gambling participation

*Number of different forms of gambling*

On average, moderate-risk non-Internet gamblers engaged in 4.10 ($SD$ = 1.84) of the ten different forms of gambling surveyed, compared to 4.49 ($SD$ = 1.79) for moderate-risk, 3.58 ($SD$ = 1.80) for problem non-Internet gamblers, and 4.97 ($SD$ = 1.85) for problem Internet gamblers. Averaged over problem gambling status, Internet gamblers ($M$ = 4.66, $SD$ = 1.82) engaged in significantly more forms of gambling compared to non-Internet gamblers ($M$ = 3.86, $SD$ = 1.83), $F(1, 1810) = 90.21$, $p < 0.001$, $\eta^2 = 0.05$. Furthermore, the interaction was significant, such that the difference between non-Internet and Internet gamblers was significantly higher for problem gamblers, $F(1, 1810) = 28.18$, $p < 0.001$, $\eta^2 = 0.02$.

*Frequency of gambling – on an annual basis*
As shown in table 1, comparisons between the groups engaging in each gambling activity showed statistically significant differences for: wagering on sporting events, wagering on horse/dog races, and gambling on EGMs. For sporting events, a main effect and interaction model logistic regression was significant, $\chi^2$ (3, $N$=1,814) = 158.21, $p < 0.001$, $\phi = 0.30$. A higher proportion of Internet gamblers bet on sporting events compared to non-Internet gamblers, Wald = 146.29, $p < 0.001$. This held for both moderate-risk, $\chi^2$ (1, $N$=1,109) = 45.27, $p < 0.001$, $\phi = 0.20$, and problem gamblers, $\chi^2$ (1, $N$=705) = 113.48, $p < 0.001$, $\phi = 0.40$. The interaction was also significant, indicating that the difference between the proportion of non-Internet and Internet gamblers betting on sports was significantly greater for problem gamblers, Wald = 13.30, $p < 0.001$.

*Insert table 1 here*

For horse/dog race wagering, the main effect and interaction model logistic regression was also significant, $\chi^2$ (3, $N$=1,814) = 231.15, $p < 0.001$, $\phi = 0.36$. A significantly higher proportion of Internet than non-Internet gamblers bet on races (93.9% vs. 67.5%), Wald = 169.98, $p < 0.001$. However, a higher proportion of moderate-risk than problem gamblers bet on horse/dog races annually (89.8% vs. 79.7%), Wald = 17.78, $p < 0.001$.

The same logistic regression model was run on prevalence of annual EGM gambling and both main effects were significant, but not the interaction. A higher proportion of non-Internet than Internet gamblers gambled on EGMs (76.4% vs. 64.5%), Wald = 20.27, $p < 0.001$. A significantly higher proportion of problem than moderate-risk gamblers played EGMs annually (75.9% vs. 63.2%), Wald = 24.00, $p < 0.001$.

Finally, a higher proportion of problem Internet gamblers played table games at land-based casinos annually, as compared to problem non-Internet gamblers, $\chi^2$ (1, $N$=705) = 22.33, $p < 0.001$, $\phi = 0.18$ and moderate-risk Internet gamblers, $\chi^2$ (1, $N$=1,263) = 12.84, $p < 0.001$, $\phi = 0.10$.

*Frequency of gambling – on at least a weekly basis*
As shown in table 2, a higher proportion of Internet than non-Internet gamblers (78.5% vs. 44.3%) bet on horse or dog races at least weekly, $\chi^2$ (1, $N$=1,772) = 200.99, $p < 0.001$, $\phi = 0.34$. A higher proportion of moderate-risk gamblers bet on horse or dog races at least weekly, compared to problem gamblers (71.3% vs. 63.4%), $\chi^2$ (1, $N$=1,772) = 12.22, $p < 0.001$, $\phi = 0.08$. A higher proportion of problem than moderate-risk gamblers played EGMs at least weekly (37.8% vs. 19.6%), $\chi^2$ (1, $N$=1,767) = 70.64, $p < 0.001$, $\phi = 0.20$, and a higher proportion of non-Internet than Internet gamblers (37.8% vs. 21.9%) played EGMs at least weekly, $\chi^2$ (1, $N$=1,767) = 47.82, $p < 0.001$, $\phi = 0.17$. Problem gamblers were more likely to play table games in land-based casinos on at least a weekly basis compared to moderate-risk gamblers (5.9% vs. 2.0%), $\chi^2$ (1, $N$=1,764) = 19.60, $p < 0.001$, $\phi = 0.11$.

*Insert table 2 here*

**Problem gambling**

*Symptoms of problem gambling*

Total PGSI scores indicated that Internet gamblers had higher problem gambling severity scores ($M$ = 1.34, $SD$ = 1.05) than non-Internet gamblers ($M$ = 1.18, $SD$ = 1.14), $t(2{,}264.1) = 4.30$, $p < 0.001$, $d = 0.14$. A chi-square test of independence indicated that a significantly higher proportion of moderate-risk than problem gamblers were Internet gamblers $\chi^2$ (1, $N$=1,814) = 14.11, $p < 0.001$, $\phi = 0.09$, although the effect size indicates this difference is most likely inconsequential. Responses to individual PGSI items were also examined. Although all items had a significant main effect between moderate-risk and problem gamblers, a few differences were found based on Internet gambling status. Non-Internet moderate-risk and problem gamblers reported feeling guilty about their gambling 'most of the time' or 'almost always' to a significantly greater extent than Internet gamblers, $\chi^2$ (3, $N$=1,813) = 47.10, $p < 0.001$, $\phi = 0.16$. Similarly, non-Internet gamblers were significantly more likely to report health and psychological problems related to gambling than were Internet gamblers, $\chi^2$ (3, $N$=1,805) = 25.30, $p < 0.001$, $\phi = 0.12$.

*Type and mode of gambling that contributed to problem gambling*

A significantly higher proportion of problem than moderate-risk gamblers reported a particular gambling form that had contributed to their gambling problems more than others (83.5% vs. 47.0%), $\chi^2$ (1, $N$=1,789) = 238.88, $p < 0.001$, $\phi = 0.37$. Non-Internet gamblers were also more likely than Internet gamblers to indicate that their problems were related to one particular gambling activity (68.5% vs. 57.9%), $\chi^2$ (1, $N$=1,789) = 17.76, $p < 0.001$, $\phi = 0.10$.

An oversight in developing the survey meant that sports betting was not provided as a response option as the type of gambling that has most contributed to problems. Of all types of gambling surveyed (table 3), horse/dog wagering and EGMs were the two that most clearly differentiated the groups of respondents. Problem gamblers were more likely than moderate-risk gamblers to indicate that horse/dog wagering contributed to their gambling problems (43.2% vs. 26.1%), $\chi^2$ (1, $N$=1,796) = 56.50, $p < 0.001$, $\phi = 0.18$. This difference was also significant for problem compared to moderate-risk Internet gamblers (51.2% vs. 27.6%), $\chi^2$ (1, $N$=1,253) = 69.66, $p < 0.001$, $\phi = 0.24$. However no significant differences were found between moderate-risk non-Internet gamblers and problem non-Internet gamblers, indicating an interaction effect displayed in figure 1. Internet gamblers were more likely than non-Internet gamblers to state that horse/dog wagering had contributed to their problem (36.1% vs. 25.0%), $\chi^2$ (1, $N$=1,796) = 20.92, $p < 0.001$, $\phi = 0.11$.

*Insert table 3 here*
*Insert figure 1 here*

Problem gamblers were significantly more likely than moderate-risk gamblers to indicate that EGMs were the most significant form of gambling that contributed to their problems (37.9% vs. 16.4%),$\chi^2$ (1, $N$=1,796) = 105.49, $p < 0.001$, $\phi = 0.24$. This difference was significant for both non-Internet and Internet gamblers, $\chi^2$ (1, $N$=543) = 54.76, $p < 0.001$, $\phi = 0.32$ and $\chi^2$ (1, $N$=1,253) = 41.15, $p < 0.001$, $\phi = 0.18$ respectively. A significantly higher proportion of non-Internet than Internet gamblers nominated EGMs as contributing to problems (18.4% vs. 39.2%), $\chi^2$ (1, $N$=1,796) = 87.99, $p < 0.001$, $\phi = 0.22$. This result was significant for both moderate-risk

and problem gamblers separately, $\chi^2$ (1, $N$=1,102) = 22.75, $p < 0.001$, $\phi = 0.14$ and $\chi^2$ (1, $N$=694) = 54.66, $p < 0.001$, $\phi = 0.28$.

As shown in table 4, a higher and statistically significant proportion of problem gamblers stated that Internet via computers, Internet via mobile phone and land-based gambling were related to their problem gambling, compared to moderate-risk gamblers ($\chi^2$ (1, $N$=1,796) = 55.06, $p < 0.001$, $\phi = 0.19$, $\chi^2$ (1, $N$=1,796) = 13.91, $p < 0.001$, $\phi = 0.09$ and $\chi^2$ (1, $N$=1,796) = 102.21, $p < 0.001$, $\phi = 0.24$ respectively). The finding that a small proportion of non-Internet gamblers attributed their problems to Internet gambling possibly indicates that some had gambled online over 12 months ago and experienced problems, or inaccurately reported their use of Internet gambling. Only one-quarter (25.9%) of Internet gamblers indicated that land-based gambling was the main form of gambling associated with their gambling problems compared to over half (56.2%) of non-Internet gamblers who attributed their problems to this mode, $\chi^2$ (1, $N$=1,796) = 152.04, $p < 0.001$, $\phi = 0.29$.

*Insert table 4 here*

*Help-seeking behaviour*

Problem gamblers were more likely than moderate-risk gamblers to report seeking help for gambling problems (33.3% vs. 5.5%), $\chi^2$ (1, $N$=1,791) = 242.23, $p < 0.001$, $\phi = 0.37$. These results held for both non-Internet and Internet gamblers, $\chi^2$ (1, $N$=541) = 92.55, $p < 0.001$, $\phi = 0.41$ and $\chi^2$ (1, $N$=1,250) = 144.06, $p < 0.001$, $\phi = 0.34$. No statistically significant differences were found for preferred mode of help, with most respondents in each category preferring face-to-face counselling over telephone or internet counselling. Problem gamblers were more likely to indicate interest in resources to help with their problem gambling, compared to moderate-risk gamblers (45.0% vs. 9.2%), $\chi^2$ (1, $N$=1,783) = 304.56, $p < 0.001$, $\phi = 0.41$. A higher proportion of non-Internet than Internet gamblers were interested in these resources (32.8% vs. 18.9%), $\chi^2$ (1, $N$=1,783) = 40.42, $p < 0.001$, $\phi = 0.15$.

*Impact of interactive feedback*

Problem gamblers were more likely to report that the survey feedback was very useful (30.4%) compared to moderate-risk gamblers (18.2%), although both groups were similarly likely to find the feedback somewhat useful (46.4% and 56.3% respectively), $\chi^2$ (1, $N$=1,773) = 36.19, $p < 0.001$, $\phi = 0.14$. Non-Internet gamblers were more likely than Internet gamblers to report the feedback was very useful (29.5% vs. 20.2%), $\chi^2$ (1, $N$=1,773) = 20.37, $p < 0.001$, $\phi = 0.11$.

Based on the feedback provided, problem gamblers were more likely than moderate-risk gamblers to report that they expected their gambling to decrease (50.7% vs. 23.4%), and less likely to expect no change in their gambling (44.5% vs. 73.0%), $\chi^2$ (1, $N$=1,771) = 149.05, $p < 0.001$, $\phi = 0.29$. Non-Internet gamblers were more likely than Internet gamblers to expect their gambling to decrease (42.2% vs. 30.5%), and less likely to expect no change (53.9% vs. 65.4% ), $\chi^2$ (1, $N$=1,771) = 22.99, $p < 0.001$, $\phi = 0.11$. No significant differences were found between groups in expectations that gambling would increase.

## Discussion

Results indicate that the relationship between Internet gambling and problem gambling is complex and mediated by engagement with land-based gambling. Analysis of demographic variables suggests that Internet problem gamblers do not represent a distinctly different cohort than gamblers who experienced problems related to land-based gambling. Nonetheless, significant findings were reported with respect to age. Younger gamblers are not only more likely to engage in Internet gambling, but are also more likely to experience significant problems. This is consistent with previous research identifying young adults (aged 18-29) as the age cohort most at-risk for gambling problems in Australia (Productivity Commission, 2010). Given that age differences between problem and moderate-risk gamblers in our sample were greatest for Internet as compared to non-Internet gamblers, these results may indicate that Internet gambling facilitates problem gambling amongst a potentially vulnerable population. Subsequently, use of Internet gambling amongst young adults is an area that warrants further attention.

Given the significantly higher average PGSI scores amongst the Internet gamblers in our sample, this group does appear more likely than non-Internet gamblers to be at-risk for gambling problems and experience related negative consequences. This is consistent with results from previous studies (Griffiths et al., 2009; Olason et al., 2011; Wood & Williams, 2011). However, Internet gamblers were not significantly more likely than non-Internet gamblers to be problem gamblers, suggesting that a greater risk of gambling problems may not always lead to development of severe gambling problems and this mode of gambling may not represent a greater risk than land-based forms. Internet gamblers appear to be more highly involved gamblers, participating in a greater variety of gambling activities than land-based gamblers, which is consistent with previous research (Griffiths et al., 2009; Wood & Williams, 2011). This suggests that highly involved gamblers may seek out the Internet to facilitate gambling, as a convenient and easily accessible way to place bets.

The results above may indicate that the additive impact of multiple gambling activities, rather than specifically engaging in online gambling, may be related to negative consequences of gambling for Internet gamblers. This is consistent with previously reported findings that overall gambling involvement is related to problem gambling severity (Holtgraves, 2009; LaPlante, Nelson, LaBrie, & Shaffer, 2009). As problem land-based gamblers had the lowest involvement in multiple forms of gambling, a singular form, most commonly EGMs, appears related to problems for land-based gamblers. Further investigation could determine whether the causal pathway to the development of gambling problems differs between these groups. As Internet gambling is relatively new, it is possible that related problems may increase over time with increased participation in this activity or if problems develop over time.

Wagering on sports and races are the main forms of legal Internet gambling in Australia, with some participants recruited from wagering sites. Therefore, it is not surprising that the Internet gamblers in our sample were more likely to engage in sports and race wagering than non-Internet gamblers. The results indicate that annual online sports wagering was related to Internet problem gambling, but not annual or weekly online race wagering, which was more common amongst Internet moderate-risk gamblers. Although a greater proportion of Internet gamblers wagered on races, compared to betting on sporting events, sports betting appears to have a greater association with gambling problems. Internet problem gamblers were most likely to nominate wagering on

races as contributing most to their problems. This may be related to the absence of sports betting as a response to this question, which is noted as a substantial limitation and prohibits firm conclusions based on these results. Advertising for sports betting has dramatically increased in recent years, particularly in relation to sponsorship of sporting events (Lamont, Hing, & Gainsbury, 2011). The increased advertising and media discussion of sports betting and odds may act as gambling triggers, making it harder for individuals to control their sports betting.

EGMs appear to be highly associated with gambling problems for non-Internet gamblers, consistent with Australian and international reports that EGM gambling is the predominant cause of gambling problems (Productivity Commission, 2010; Wardle et al., 2011). This finding is important, as it suggests that EGM problem gamblers have not gravitated to Internet gambling to the same extent as other types of gamblers, despite the availability of online EGMs. It suggests that problems related to EGMs may not be solely attributed to game characteristics, but that environmental factors, such as venues providing an escape from daily life, may contribute to problem gambling. Almost one-in-five Internet gamblers indicated that EGMs contributed most to their gambling problems and over one-quarter of Internet gamblers attributed their problems to land-based play. This suggests that some EGM players use Internet gambling as a supplementary form of gambling, which may exacerbate problems, as opposed to causing new problems specifically related to Internet gambling. However, given the results were based on self-report, they are not fully indicative of causality of problems.

Specific negative consequences from gambling appear similar between Internet and non-Internet, moderate-risk, and problem gamblers; this suggests that mode of gambling does not have a distinctly different impact on resulting harms. The finding that non-Internet moderate-risk and problem gamblers were more likely to feel guilty, and experience health and psychological problems, may indicate a greater awareness of negative consequences, or the greater impact of land-based gambling, specifically EGMs. Alternatively, gamblers with health and psychological problems may be less likely to gamble on the Internet, although this is contrary to reports that individuals with a disability are more likely to gamble online (Wood & Williams, 2007). Non-Internet gamblers were more likely to nominate a specific form of gambling that contributed to problems, to have sought help for gambling problems, and to request help resources. This suggests that EGM problem gamblers may be more aware of the negative consequences of this activity and to recognise their own problems. Alternatively, as Internet gambling was more common amongst young adults, this may reflect the lower rates of help-seeking amongst this population (Productivity Commission, 2010). These findings may also be related to increased public education about the risks associated with EGM play over the past few years, and discussions of EGM reforms in Australian politics and the media during the survey administration period. Internet gamblers may be less likely to recognise the negative consequences of their gambling or the need for help for gambling problems. The failure of Internet gamblers to recognise their gambling problems is potentially troubling given that Internet gambling typically occurs in private. If Internet gamblers do not recognise their problems these may continue and potentially worsen until a crisis point is reached.

Provision of normative feedback for all participants was reported as relatively useful and approximately half of the problem gamblers expected their gambling to decrease as a result. This is an important finding given that the feedback is a low-intensive intervention that was relatively

easy to provide. Moderate-risk gamblers also reported that the feedback would impact their gambling, but to a lesser degree, as would be expected given their less severe problems. These findings confirm previous research on the usefulness of normative feedback for gambling and in facilitating appropriate modifications to play (Cunningham, Hodgins, Toneatto, Rai, & Cordingley, 2009; Gainsbury & Blaszczynski, 2011a; 2011b; Wood & Williams, 2010). Although there was no direct test of effectiveness, provision of normative feedback for all participants appeared to be relatively useful, based on participants' reports. It is possible that this feedback may have influenced subsequent responses by participants, with the unintentional effect of reducing accuracy of the results. However, as the survey was conducted online and in private, this effect would likely have been minimal.

*Limitations*

The methodology used to recruit participants means that our survey results are not representative of all gamblers in Australia. Use of online recruitment meant that gamblers who are not active Internet users were unlikely to be included and a disproportionate number of Internet gamblers participated; however including Internet users who do not gamble online removes the potential confounding variable of technological literacy. Advertisements could only be placed on sites that agreed to support the research and on legal wagering sites, limiting the potential recruitment of Internet gamblers who use offshore and non-participating gambling sites. Nonetheless, the sample is quite large compared to previous online surveys of gamblers and allowed adequate analyses of variables, except gender, given the few women recruited.

Classifying anyone who had participated in Internet gambling at least once in the past 12 months as an Internet gambler does not differentiate between participants based on frequency of Internet gambling. Future research should quantify the extent of involvement in Internet gambling to enable evaluation of regular Internet gamblers. Finally, the accidental omission of sports betting as a response option for most problematic gambling activity is a major limitation to understanding the types of gambling most associated with harms. Small inconsistencies in how questions were asked for each type of gambling may also bias responses, and future research should ensure all questions are consistently asked.

## Conclusions

Many differences between Internet and non-Internet gamblers appear to be moderated by levels of problem gambling severity, suggesting that problem Internet gamblers are somewhat different from problem non-Internet gamblers. Accordingly, attention to the need for differential treatment and prevention initiatives is warranted. Specifically, younger adults and more involved gamblers appear at greatest risk of becoming problem Internet gamblers. Use of Internet gambling sites may be attractive to highly involved gamblers, and their ease of access and convenience may lead to expenditure beyond personal limits and subsequent problems.

For over one-quarter of Internet problem gamblers, Internet gambling seems to exacerbate rather than be the central contributing form of problems. These findings highlight the importance of considering all gambling when investigating the impact of Internet gambling, as some Internet gamblers may have problems related to other modes of access and Internet gambling may be attractive to existing problem gamblers.

Internet problem gamblers appear to have lower recognition of their problems, and to be less likely to seek information or help resources to minimise harms. This may be related to the younger age of Internet problem gamblers; however, increased attention paid to EGMs by the media, politicians, and community groups, may be successfully increasing awareness among EGM players of the risks associated with this activity. Comparatively little attention has been given to the potential harms associated with Internet gambling. Subsequently, Internet problem gamblers may not recognise the negative consequences of their gambling, which may also go undetected by others, given the privacy and anonymity of online gambling. Therefore, further efforts are needed to increase public awareness of the risks of Internet gambling. These should be particularly directed towards younger adults and highly involved gamblers, who are at greatest risk of harm.

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Table 1 – Number and proportion (by column) of respondents from each category of gamblers who gamble on each form of gambling on an annual basis.

| Type of gambling | Moderate-risk Gamblers | | Possible Problem Gamblers | |
|---|---|---|---|---|
| | Non-Internet Gamblers | Internet Gamblers | Non-Internet Gamblers | Internet Gamblers |
| Instant Win | 154 (51.2%) | 406 (50.2%) | 125 (50.0%) | 230 (50.5%) |
| Lotteries | 204 (67.8%) | 554 (68.6%) | 142 (56.8%) | 306 (67.3%) |
| Sporting Events | 169 (56.1%) | 620 (76.7%) | 105 (42.0%) | 370 (81.3%) |
| Horse/Dog Racing | 232 (77.1%) | 764 (94.6%) | 140 (56.0%) | 422 (92.7%) |
| Bingo | 34 (11.3%) | 53 (6.6%) | 20 (8.0%) | 42 (9.2%) |
| Games of skill against other people | 52 (17.3%) | 131 (16.2%) | 36 (14.4%) | 104 (22.9%) |
| Poker | 69 (22.9%) | 246 (30.4%) | 39 (15.6%) | 177 (38.9%) |
| Pokies/Electronic gaming machines | 214 (71.1%) | 487 (60.3%) | 207 (82.8%) | 328 (72.1%) |
| Table games at a casino | 95 (31.6%) | 307 (38.0%) | 75 (30.0%) | 220 (48.4%) |
| Internet casino | 0 (0%) | 60 (7.4%) | 0 (0%) | 63 (13.8%) |
| *Total N* | *301* | *808* | *250* | *455* |

Table 2 – Number and proportion (by column) of respondents from each category of gamblers who gamble on each form of gambling on a weekly basis.

| Type of gambling | Moderate-risk Gamblers | | Possible Problem Gamblers | |
|---|---|---|---|---|
| | Non-Internet Gamblers | Internet Gamblers | Non-Internet Gamblers | Internet Gamblers |
| Instant Win | 20 (6.7%) | 45 (5.6%) | 19 (7.6%) | 41 (9.1%) |
| Lotteries | 73 (24.8%) | 161 (20.2%) | 42 (16.9%) | 94 (21.0%) |
| Sporting Events | 67 (23.1%) | 380 (47.8%) | 48 (19.5%) | 238 (53.1%) |
| Horse/Dog Racing | 152 (52.1%) | 623 (78.4%) | 83 (34.7%) | 351 (78.7%) |
| Bingo | 6 (2.1%) | 8 (1.0%) | 5 (2.1%) | 9 (2.0%) |
| Games of skill against other people | 8 (2.8%) | 24 (3.0%) | 8 (3.3%) | 20 (4.5%) |
| Poker | 11 (3.9%) | 88 (11.1%) | 8 (3.3%) | 67 (15.2%) |
| Pokies/Electronic gaming machines | 79 (27.1%) | 133 (16.9%) | 123 (50.4%) | 137 (30.9%) |
| Table games at a casino | 8 (2.8%) | 13 (1.7%) | 12 (4.9%) | 29 (6.5%) |
| Internet casino | 0 (0%) | 11 (1.4%) | 0 (0%) | 22 (5.0%) |
| *Total N* | *301* | *808* | *250* | *455* |

Table 3 – Number and proportion (by column) of respondents from each category of gamblers who responded that each type of gambling has contributed to their gambling problems (multiple responses possible).

| Type of gambling | Moderate-risk Gamblers | | Possible Problem Gamblers | |
|---|---|---|---|---|
| | Non-Internet Gamblers | Internet Gamblers | Non-Internet Gamblers | Internet Gamblers |
| Lotteries | 6 (2.0%) | 8 (1.0%) | 9 (3.7%) | 11 (2.4%) |
| Instant Win | 2 (0.7%) | 2 (0.2%) | 6 (2.4%) | 6 (1.3%) |
| Horse/Dog Racing | 66 (22.1%) | 222 (27.6%) | 70 (28.6%) | 230 (51.2%) |
| Bingo | 1 (0.3%) | 3 (0.4%) | 2 (0.8%) | 3 (0.7%) |
| Pokies/Electronic gaming machines | 75 (25.2%) | 106 (13.2%) | 138 (56.3%) | 125 (27.8%) |
| Blackjack | 5 (1.7%) | 17 (2.1%) | 17 (6.9%) | 24 (5.3%) |
| Baccarat | 2 (0.7%) | 0 (0.0%) | 5 (2.0%) | 9 (2.0%) |
| Roulette | 15 (5.0%) | 9 (1.1%) | 10 (4.1%) | 14 (3.1%) |
| Poker | 11 (3.7%) | 19 (2.4%) | 8 (3.3%) | 30 (6.7%) |
| Games of skill against other people | 2 (0.7%) | 1 (0.1%) | 4 (1.6%) | 2 (0.4%) |
| Other | 5 (1.7%) | 23 (2.9%) | 4 (1.6%) | 28 (6.2%) |
| *Total N* | *298* | *804* | *245* | *449* |

Table 4 – Number and proportion (by column) of respondents from each category of gamblers who responded that each type of gambling has contributed to their gambling problems (multiple responses possible).

| Mode of gambling | At-Risk Gamblers | | Possible Problem Gamblers | |
|---|---|---|---|---|
| | Non-Internet Gamblers | Internet Gamblers | Non-Internet Gamblers | Internet Gamblers |
| Internet via computers | 13 (4.4%) | 190 (23.6%) | 12 (4.9%) | 223 (49.7%) |
| Internet via mobile phone | 2 (0.7%) | 17 (2.1%) | 6 (2.4%) | 27 (6.0%) |
| Internet via wireless device | 0 (0%) | 5 (0.6%) | 0 (0%) | 4 (0.9%) |
| Interactive TV | 4 (1.3%) | 1 (0.1%) | 4 (1.6%) | 3 (0.7%) |
| Land-based gaming | 125 (41.9%) | 162 (20.1%) | 180 (73.5%) | 163 (36.3%) |
| Betting via telephone | 11 (3.7%) | 19 (2.4%) | 9 (3.7%) | 27 (6.0%) |
| *Total N* | *298* | *804* | *245* | *449* |

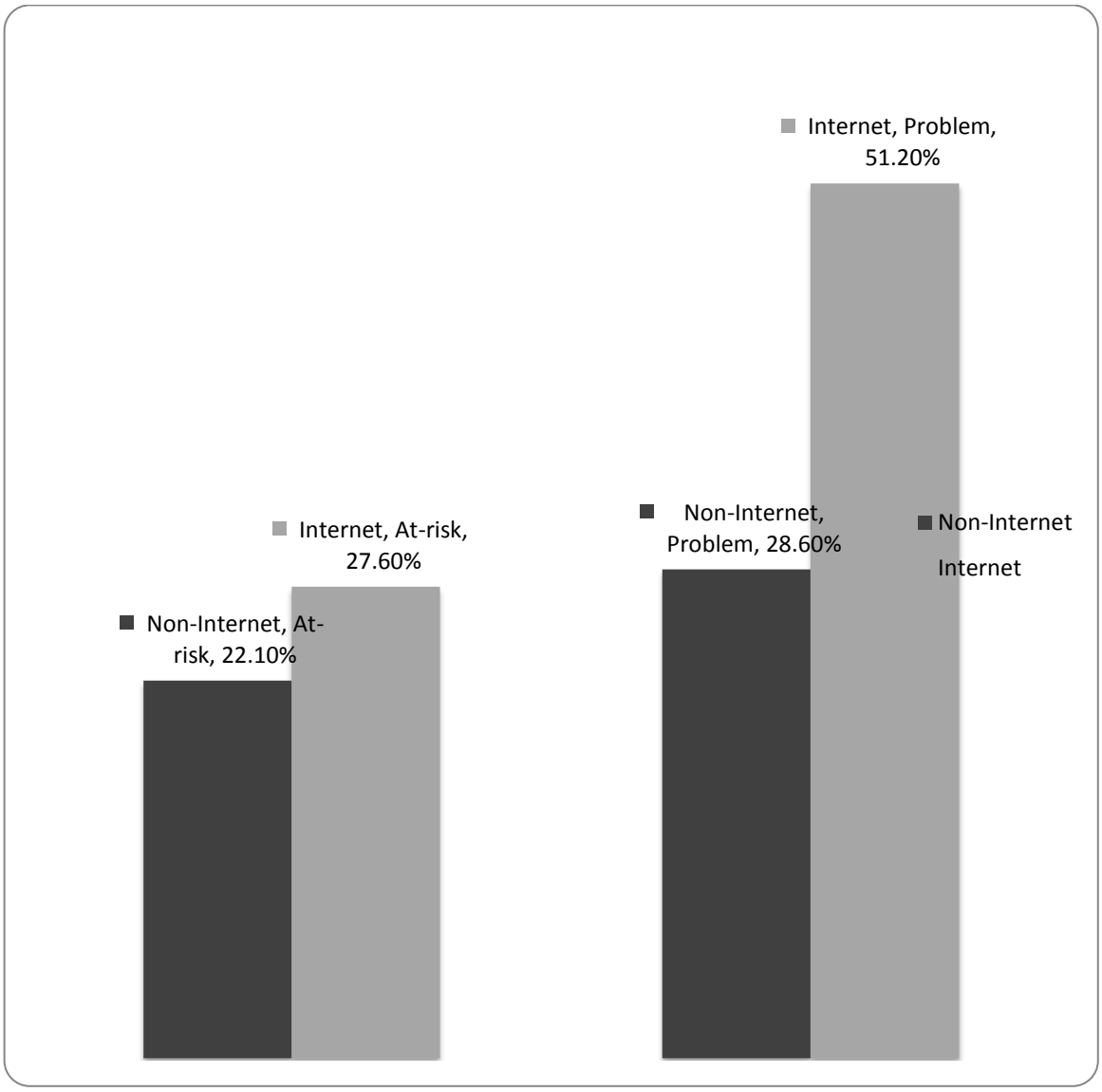


Figure 1. Proportion of respondents from each category of gamblers who responded that horse/dog race wagering was the primary contributor to their gambling problems