

# Exposure to Free-Play Modes in Simulated Online Gaming Increases Risk-Taking in Monetary Gambling

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**Abstract** This study examined the behavioral effects of practice modes in simulated slot machine gambling. A sample of 128 participants predominantly aged 18–24 years were randomly allocated to 1 of 4 pre-exposure conditions: control (no practice), standard 90 % return to player, inflated return to player and inflated return with pop-up messages. Participants in all conditions engaged in monetary gambling using a realistic online simulation of a slot machine. As predicted, the results showed that those players exposed to inflated or ‘profit’ demonstration modes placed significantly higher bets in the real-play mode as compared to the other groups. However, the groups did not differ in relation to how long they persisted in the real-play mode. Pop-up messages had no significant effect on monetary gambling behavior. The results of this study confirm that exposure to inflated practice or “demo” modes lead to short-term increases in risk-taking. These findings highlight the need for careful regulation and monitoring of internet gambling sites, as well as further research on the potential risks of simulated gambling activities for vulnerable segments of the gambling population.

**Keywords** Internet gambling · Payout rates · Pathological gambling · Slot machines

## Introduction

Gambling in Australia is a widely popular and socially accepted form of leisure and entertainment (Delfabbro and King 2012). Prevalence studies suggest that over 70 % of adults in Westernised countries gamble at least once per year, and total net revenue for the gambling industry is substantial and increasing over time. For example, in Australia in 2011–2012, over \$AUS19 billion was spent on gambling with approximately 60 % of this

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being derived from electronic gaming machines (EGMs) located in casinos, clubs and hotels (Productivity Commission 2010). EGMs involve a very rapid and continuous form of gambling in which players can place bets to obtain wins based on the occurrence of combinations of symbols on spinning “reels”. On the high intensity machines located in Australia and New Zealand, players can gamble up to 17 spins per minute, play most hours of the day, and play for very long periods. As a result, EGMs are estimated to be a high risk form of gambling and have been the subject of the many regulatory controls and concerns, not only in Australia, but also in other parts of the world (Dowling et al. 2005).

Until recently, EGMs were purely a land-based form of gambling, available only to those who were willing to leave their homes and visit a licensed venue. However, EGMs, along with many other gambling activities, are now increasingly available online (Griffiths 1999, 2003). Although a proportionately smaller segment of the overall gambling industry, the internet gambling sector has grown exponentially since the mid 1990s with the total number of online gambling sites has increased from just 30 in 1994 to over 2,200 in 2009 (Casino City 2009). Internationally, internet gambling is now well established. Players can create accounts, use credit cards or other online transaction methods to engage in online versions of popular casino activities as well as wagering activities (e.g., horse racing and sports-betting). In many European countries, internet gaming is actively sanctioned by the governments, whereas other countries such as Australia have placed restrictions on this type of activity. Under Australia’s *Interactive Gaming Act 2003*, gambling services (apart from wagering) cannot be legally offered to Australian citizens, so that all internet gaming (such as playing slot machines) must be undertaken using international sites.

At the present time, it is estimated based on account data activity that around 4–5 % of Australian adults gamble on the internet (Productivity Commission 2010), although a report by Nielson (2010), based on a nationally representative sample, found that 30 % of Australians aged over 16 had reported gambling online at some point during 2009. Research evidence suggests that most internet gambling in Australia involves wagering, which suggests that people are using the internet more as conduit for accessing existing activities rather than as an avenue for gambling on new activities (Gainsbury 2010). However, internet gambling has continued to attract attention because it has been consistently shown that people who experience problems with gambling are more likely to report gambling on the internet (Ladd and Petry 2002; Wood and Williams 2007). This does not, of itself, imply that internet gambling is more harmful than traditional forms (Peller et al. 2008), but available evidence suggests that the online medium is attractive to problem gamblers and that internet gambling may pose some risks which are less evident in traditional venue-based forms of gambling.

### Risks Associated with Internet Gambling

It has been argued that the internet has altered both the situational and structural characteristics of gambling (Griffiths 2003; Griffiths et al. 2009; King et al. 2010); these include features of the environment that allow a person to gamble and also the features of the gambling activity itself that encourage a person to gamble (Griffiths 1999). For example, internet gambling is more readily accessible than most land-based forms of gambling, it can be undertaken without any other social contact, and the activities are entirely electronic and based on credits rather than the physical transfer of money. In addition to increasing the accessibility and availability of gambling to existing gamblers, it is thought that the internet has reduced the barriers of entry for new socio-demographic groups who might

ordinarily be restricted from entering real world gambling venues. These include those under the influence of drugs or alcohol as well as adolescents who can readily bypass the age-verification checks imposed by some sites (Griffiths and Parke 2010; McBride and Derevensky 2009).

Another difference between internet gambling sites and real life venues is that gambling can often be promoted in a way that does not necessarily have to comply with state or federal government regulations. When hosted overseas, internet gambling sites are more difficult for governments to control, so that activities can be promoted and advertised often with few constraints or restrictions (McMullan and Kervin 2012; Monaghan et al. 2008). Such lack of regulatory oversight, it is argued, could pose a risk to certain vulnerable groups, including young people because they have a very high involvement in internet-based activities and also appear to have a greater risk of developing problems associated with gambling (see Volberg et al. 2010). Many young people are therefore likely to encounter online gambling activities and promotions, which may influence their developing perceptions of how gambling works or reinforce existing unrealistic or biased views of gambling. In support of this view, Derevensky and Gupta (2007) reports Canadian survey results which indicated that 93 % of adolescents had reported being exposed to pop-up advertisements for gambling sites, and that 61 % had received promotional gambling emails. Another study by McMullan and Kervin (2012) found that some online gambling sites promote activities in a way that is potentially misleading, for example, by using messages or slogans that play on cognitive and motivational factors known to be associated with problem gambling: (a) by referencing the arousal-producing nature of gambling activities i.e. “feel the excitement”, (b) highlighting gambling as a means of escape i.e. “play here and be famous”, or (c) by emphasising the ‘skills’ involved in gambling e.g. “outsmart, outbet and outplay everyone else on the table and walk away with that jackpot”. Derevensky and Gupta (2007) express concerns that such advertisements would very likely resonate with young people and could send the message that gambling is a “shortcut to success” (Derevensky and Gupta 2007) or give the impression that gambling is a harmless activity where making money is a natural and likely outcome (McMullan and Kervin 2012).

### Practice Modes in Internet Gambling

A common promotional feature of internet gambling sites is the practice or “demo” (also: “free play”) gambling modes. In effect, a “demo” mode is a game or segment of play which allows people to gamble without using any real money. Ostensibly, the purpose of these sites is to familiarise people with the operation and rule of the game, but they are also a promotional tool which can be used to attract interest in the activity. These “demo” gambling activities are known to be available via smartphones, social networking sites (e.g., Facebook), and video gaming technologies (King et al. 2012, 2014; Griffiths and Wood 2000). Sevigny et al. (2005) reported that gambling sites will often send emails to players about such practice modes as a way of promoting monetary gambling. One risk of these promotional games is that many do not appear to provide an accurate portrayal of the return to player rate within the gambling activity. A pay-out rate or return to player (RTP) rate is defined as the amount of money won divided by the amount of money wagered multiplied by 100. To make a profit, a vendor must maintain a RTP rate below 100 % (on Australian slot machines this is typically 90 %). Based on a review of 117 online gambling sites offering a demo version of slot-machine simulations, Sevigny et al. found that 45 of

these sites (39 %) had pay-out rates that were greater than 100 %. However, these authors found that the inflated rates provided in “demo” modes were usually not maintained when players progressed to real gambling.

Many sites that offer “demo” modes also combine these promotions with slogans or pop-up comments (e.g., “practice really does make perfect”), presumably to make players feel more confident and motivated to continue playing (King et al. 2010). Derevensky et al. (2010) reported that, among young people aged 12–19 years, gambling advertisements were associated with self-reported changes in gambling behaviours. Specifically, they found that 16 % of social gamblers versus 50 % of problem gamblers reported that advertisements increased their interest in gambling. While promotional strategies may not be deliberately targeted at any particular demographic group, research evidence suggests that young people readily come in contact with them (Derevensky and Gupta 2007; McMullan et al. 2012). For example, in a recent prevalence study of nearly 9,000 UK children aged 12–15, 28 % reported having tried online practice modes (Ipsos MORI 2009). It has been argued that these experiences provide opportunities for adolescents to become more familiar with gambling in general (King et al. 2010) and may encourage a view of gambling as “just a game” because the lack of negative consequences (Griffiths 2003). Forrest, McHale and Parke for Ipsos MORI (2009) reported that playing free-play modes was significantly associated with involvement in real gambling and problem gambling amongst adolescents. On the basis of preliminary findings, there is a need for experimental research designed to understand the impact of these practice modes on subsequent gambling.

## The Current Study

This experimental study was designed to examine the influence of gambling practice modes on gambling persistence and risk-taking, and perceptions of control over gambling outcomes. A previous study by Bednarz et al. (2013) that employed an experimental design reported that exposure to free-play modes increased risk-taking behaviors and self-ratings of gambling proficiency in simulated roulette. This study aimed to extend this work by examining demo modes in relation to slot-machines. More generally, this study aimed to add to knowledge of the psychological effects of inflated pay-out rates and pop-up messages during practice modes. It was hypothesised that participants exposed to the practice phase conditions would take larger risks (i.e., place greater bets) and demonstrate greater persistence during the monetary gambling phase as compared to those participants in the control condition.

## Methodology

### Participants

The study involved 128 participants (55 males, 73 females) of whom 42 were first year psychology students who were participating for course credit. The remaining 86 were university students and members of the broader community who were invited to take part in the study via advertisements placed around campus and on the internet. Inclusion criteria included: (i) being 18 years or older, (ii) gambling experience in the past 12 months and (ii) not currently receiving treatment for problem gambling. Criterion (ii) was employed

for ethical reasons to ensure that the study did not expose new individuals to monetary gambling. Most (78.9 %) of the participants indicated that they were in the age category 18–24 years, followed by 11.7 % (25–30), 5.5 % (31–40), 3.1 % (41–50) and 0.8 % (51–60). The majority of participants (78.9 %) were born in Australia.

## Research Design

A between-subjects experimental design was employed (see Table 1). Participants were randomly allocated to either the control group (no practice) or one of three conditions that involved playing a practice version of the slot-machine simulation before progressing to a monetary gambling phase. The three practice phase conditions were: (i) standard practice condition, where participants experienced a 90 % return to player (RTP) rate (an overall loss); (ii) a profit practice condition, where participants were exposed to a 150 % RTP (they won overall); and, (iii) the profit + pop-up condition where participants received this same 150 % RTP rate and were also periodically exposed to encouraging pop-up messages. The following five messages were programmed to appear to these participants after predetermined winning spins: ‘You’re one of our most skilful players!’, ‘It looks like you’ve got this worked out!’, ‘That was due!’, ‘This looks like the game for you!’ and ‘Practice really does make perfect!’ The fourth condition (i.e., profit + pop-ups) was included to enable an examination of the potential influence of the pop-up messages alone.

## Slot-Machine Simulation

A three reel slot-machine was used as the gambling activity for the study. Although less complex than many modern slot machines, this design enabled greater experimental parsimony and control. Aesthetically, the gambling simulation was designed by a professional graphic design artist to resemble those slot-machines commonly found in online casinos. The simulation employed a gender neutral “university” theme designed to appeal to student participants. Sound effects and spin animations were employed to increase ecological validity of the simulation. The simulation process was written using four major programming languages (i.e., standard HTML, PHP, Javascript and MYSQL). The simulation was hosted online, and all data were monitored and stored on a remote server without the need of direct observation by an experimenter.

To ensure a constant RTP rate during the practice phase, the slot machine simulation was programmed to return a pre-determined string of outcomes (which were altered to result in either a 90 % or 150 % RTP) and participants were restricted to betting 1 credit per spin. The gambling phase was also programmed to return a pre-determined sting of outcomes (to result in a 90 % standard RTP) however participants were given multiple betting options: 1, 5, 10 or 20 credits per spin (1 credit = \$0.01). Therefore, all participants experienced an identical pattern of wins and losses throughout the gambling phase but the final balance was dependent upon selected bet size.

## Survey Measures

All participants completed a questionnaire prior to participation in the active experimental phase of the study. This questionnaire included the following measures.

**Table 1** Summary of experimental design (4 between groups)

<i>Control</i> : no practice	Gambling phase (50 compulsory trials and then choice to continue)
<i>Practice Phase 1</i> : 90% return to player (loss)	
<i>Practice Phase 2</i> : 150% return to player (profit)	
<i>Practice Phase 3</i> : 150% return to player (profit) + pop-up messages	

The principal between group comparisons involve the differences in performance observed in the gambling phase

### Demographics and Gambling Experience

General demographic information including age, gender, and country of birth was assessed. Participants were asked to record how often they had gambled on a variety of activities, including using the internet or hand-held devices such as smartphones and tablets. A five-point frequency scale was used: 1 (*never*), 2 (*1–2 times per year*), 3 (*3 times per year to 1 time per month*), 4 (*2–3 times per month*) and 5 (*weekly*).

### Problem Gambling Severity Index (PGSI)

Participants completed the Problem Gambling Severity Index (PGSI), a 9-item self-report instrument (Ferris and Wynne 2001) that assesses problematic gambling behavior in the previous 12 months. Scores on the 9 items were summed to give a total ranging between 0 and 27. Higher scores indicate greater risk of problem gambling. The PGSI test manual states that a score of 0 indicates non-problem or normal gambling, a score of 1 or 2 indicates low-risk gambling, a score between 3 and 7 indicates moderate-risk gambling, and a score of 8+ indicates problem gambling. The PGSI was administered to ascertain the gambling-status of the sample to allow insights into the similarity of this sample to any future studies that might employ a similar methodology.

### Experimental Measures

Upon completion of the survey, participants were asked to participate in the active gambling phase of the study, which involved first playing the demo mode followed by monetary gambling. Participants in the control group did not play the demo mode. During the gambling phase, the bet size for each spin was recorded along with a running tally of their balance, how many spins a player chose to complete and the final balance that was obtained. Greater risk-taking was indicated by increase in bet size, as well as the mean bet size calculated at the end of play. Players' gambling persistence was assessed as the choice to continue playing beyond the minimum 50 spins, and the number of additional spins played.

## Procedure

The study was hosted on a website and accessed remotely by participants. Prior to commencing participants were presented with an information sheet and consent form, and were informed that the study involved simulated and monetary gambling. Participants were instructed to ensure that sound speakers or headphones were enabled before commencing the study. Upon providing consent, participants were randomly assigned to one of the four experimental conditions. The study involved 4 phases: (1) pre-gambling survey, (2) demo gambling phase, (3) monetary gambling phase, and (4) post-gambling survey. Those participants in the control group did not participate in phase 2. The demo gambling phase required completion of the 50 spins before progression to the gambling phase. Participants were informed that they had \$10.00 worth of credits, and were able to bet either 1, 5, 10 or 20 credits per spin (1 credit = \$0.01). After a participant had completed the minimum 50 spins, they were able to take their winnings or continue playing for up to another 50 spins. A debriefing page with contact information for gambling support services was provided. Participants' final balance was rounded up to the nearest \$5 amount and sent to them in the form of a gift card (these were only available in \$5 increments).

## Results

### Demographics and Gambling Frequency

Demographic measures were first examined to ensure equivalence across experimental conditions. Chi square tests revealed that the conditions did not differ significantly according to gender  $\chi^2(3) < 1$ , age  $\chi^2(3) = 7.11, p > .05$  or place of birth  $\chi^2(3) = 4.13, p > .05$ . Almost all participants (97.7 %) reported gambling on at least one of the activities listed in the past 12 months. The gambling activity most frequently reported was poker-machines ( $n = 93, 72.7\%$ ), followed by scratch-tickets ( $n = 84, 65.6\%$ ) and card games ( $n = 80, 62.5\%$ ). Only 18.7 % of participants reporting that they had gambled online in the past 12 months.

Problem gambling (PGSI) scores were generally low and only 4 participants (3.1 % of the sample) would be considered problem gamblers (scored 8+). An additional 15.6 % (20 participants) scored between 3 and 7 on the PGSI which indicates moderate-risk gambling. Between-group analysis indicated that PGSI classifications did not differ according to gender,  $\chi^2(1) = 2.85, p > .05$ , or experimental group,  $\chi^2(3) = 1.42, p > .05$ .

### Equivalence of Experimental Conditions

It is possible that experimental conditions could be influenced by differences in variations of outcomes experienced during the gambling phase. Thus, to assess whether the final balances of each gambling phase were equivalent across all conditions, the minimum, maximum and closing credit balances were compared (Table 2). A one-way ANOVA showed that there were no significant differences across the experimental conditions in relation to minimum balance,  $F(3, 124) = 2.66, p > .05$ , maximum balance,  $F(3, 124) = 1.33, p > .05$ , or closing credit balance,  $F(3, 124) = .44, p > .05$ . As noted above, the sequence of win outcomes was programmed to return 90 % assuming a constant bet size over 50 spins of the demo gambling phase. However, in this model, some players were able to obtain a larger return by varying their bet sizes which inflated the average

**Table 2** Comparison of outcomes across the 4 groups

	Minimum credit balance <i>M (SD)</i>	Maximum credit balance <i>M (SD)</i>	Closing balance <i>M (SD)</i>	Average return to player <i>M (SD)</i>
Control ( <i>n</i> = 34)	838.3 (123.8)	1,056.8 (77.9)	994.3 (117.0)	99.43
Standard practice ( <i>n</i> = 30)	786.9 (140.2)	1,041.9 (50.9)	995.3 (70.6)	99.53
Profit practice ( <i>n</i> = 33)	757.0 (137.9)	1,050.6 (81.8)	996.0 (125.1)	99.6
Profit + Messages ( <i>n</i> = 31)	760.9 (128.5)	1,078.5 (83.6)	1,023.5 (148.7)	102.35
Total	786.6 (135.2)	1,057.0 (75.4)	1,003.5 (122.0)	100.35

**Table 3** *M (SD)* bet sizes for blocks of 10 spins and across the first 50 spins for the 4 experimental groups

	Spin 1–10	Spin 11–20	Spin 21–30	Spin 31–40	Spin 41–50	Total 1–50
Control ( <i>n</i> = 34)	6.6 (5.0)	8.2 (6.5)	9.2 (7.2)	8.2 (6.9)	8.3 (6.9)	8.1 (5.8)
Standard practice ( <i>n</i> = 30)	9.8 (7.6)	10.6 (8.0)	10.9 (8.2)	11.2 (8.4)	10.2 (7.8)	10.5 (7.5)
Profit practice ( <i>n</i> = 33)	11.3 (7.6)	11.5 (7.7)	12.2(7.6)	12.6 (7.7)	12.9 (7.4)	12.1 (7.0)
Profit + Messages ( <i>n</i> = 31)	12.8 (7.0)	14.0 (6.5)	12.9 (7.0)	13.4 (7.4)	12.7 (6.6)	13.2 (6.5)

RTP rate. Given that there were no significant differences in overall RTP rates across the four conditions, overall RTP was not considered to be a potential confound for any observed behavioural differences in the monetary gambling phase.

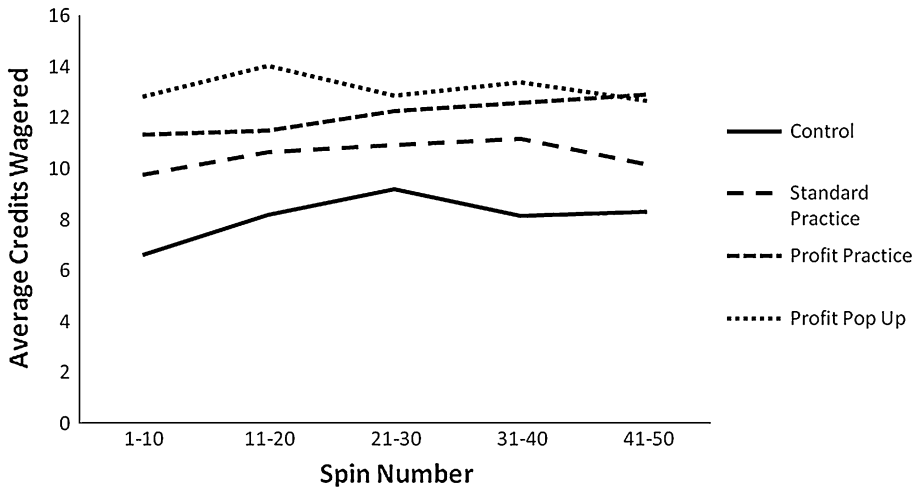
### Risk Taking

Risk-taking was measured by the number of credits participants selected to bet per spin during the monetary gambling phase, with a higher bet size indicating a greater tendency towards risk. Average bet size was calculated for 5 blocks of 10 spins throughout the gambling phase as well for the total 50 spins (see Table 3). Investigation of these data was undertaken using a 4 Condition  $\times$  5 Block ANOVA with repeated measures on Block. This revealed a significant main effect of Condition,  $F(3, 124) = 3.55, p < .05 (\eta^2 = .08)$ , a main effect of Block,  $F(4, 496) = 3.15, p < .05 (\eta^2 = .03)$ , but no significant Condition  $\times$  Block interaction,  $F(3, 124) < 1$  (Fig. 1).

### Persistence

It was hypothesised that behavioral persistence would be greater in the practice conditions than the control group. This effect was expected to be stronger amongst participants in the profit and profit + pop-up practice conditions. Within the total sample, 36 participants (28.1 %) chose to play on beyond the required 50 spins. However, there was no significant association between experimental condition and behavioral persistence,  $\chi^2(3) = 6.27, p > .05$ . The descriptive statistics for the participants who chose to continue is summarised in Table 4.





**Fig. 1** Average credits wagered across blocks of spins for first 50 spins of gambling phase across experimental groups

**Table 4** Descriptive statistics (% , Min, Max, M and SD) for persistence ( $n = 36$ )

Group	No. persisted $n$ (%)	Extra spins			
		Minimum	Maximum	$M$	$SD$
Control	7 (20.6)	2	50	20.3	20.6
Standard practice	5 (16.7)	4	50	28.4	20.6
Profit practice	11 (33.3)	12	50	42.6	13.6
Profit pop-up	13 (41.9)	2	50	34.0	19.0

**Discussion**

The aim of this study was to investigate the behavioral effects of a ‘demo mode’ with inflated return-to-player (RTP) payout and pop-up messages on subsequent financial gambling behavior and cognitions. As hypothesised, those participants in the inflated RTP practice and inflated RTP + pop-up conditions were found to bet larger amounts when subsequently engaged in monetary gambling as compared to the control group. Therefore, this study suggests that gambling activities with misleading free play or demo modes may tend to engage in riskier gambling behavior than gambling activities without demo modes. However, there were no significant differences in gambling activity between the standard practice group and the control group, indicating that a practice gambling mode increases a players’ tendency to place larger bets when gambling with money only when the practice mode is presented as profitable. There were also no significant differences between the profit practice and the profit + pop up practice conditions suggesting that exposure to the reinforcement of the pop-up messages did not influence risk-taking over and above that of the inflated RTP rates.

No significant differences were observed between conditions in persistence during the subsequent real gambling phase. Therefore, the hypothesis that participants in the practice

phase conditions would demonstrate greater behavioral persistence was not supported. Overall, there was support for the hypothesis that exposure to a practice mode of play that presents an overly inflated RTP rate can lead to riskier gambling behavior. This finding suggests that positive expectancies about gambling outcome can be produced rapidly and in the absence of actually winning money. Additionally, the observation that participants did not vary their bet sizes throughout the subsequently non-profitable gambling phase (i.e., to minimise losses), suggests that players may have been unaware of the change in the RTP rate from the practice phase to the monetary gambling phase. This result was consistent with research by Weatherly and Brandt (2004) which demonstrated that slot machine players are generally insensitive to variations in payout schedules.

It had also been anticipated that pop-up messages might further strengthen the effects of the winning condition, but this was not borne out in the results. Several reasons could be advanced for this. One possibility is that participants may have already made up their mind when they commenced the task that it involved very little skill, so that would be difficult to alter this perception once the experiment had commenced. Another possibility is that players may not have attended very strongly to the messages because they were intent on playing the game.

We also found no significant differences between the standard practice and control groups. This suggests that mere exposure to a practice mode (without an inflated RTP) does not, in itself, increase behavioral risk-taking. It is possible that this effect may be explained by the “framing effects” described within Prospect Theory. The theory states that people demonstrate greater sensitivity to the probability of losing money than to the prospect of gaining the same amount of money (Novemsky and Kahneman 2005). Participants in the standard practice group, having already experienced an overall loss in the practice phase, may have been inclined to adopt a more conservative betting strategy during the gambling phase in comparison to participants in other practice conditions that experienced an overall win.

Although it was predicted that participants would gradually increase their bet size throughout the monetary gambling phase, the results indicated that across all conditions bet sizes remained unexpectedly stable throughout the fifty spins. This may suggest that once a player has chosen an initial bet size they are unlikely to vary this value. A possible explanation for this is the Anchoring-and-Adjustment effect proposed by Tversky and Kahneman (1992) in which numerical estimations are affected by numbers they have recently used. Specifically, people often ‘anchor’ to a particular value and use it as a reference point for future decisions which remain, as a result, relatively close to the original value. This tendency is common in gambling activities, where there is uncertainty regarding the correct option to choose. Across all conditions in this study, participants may have been unsure of the outcome of the slot-machine, appeared to anchor to a particular value in their early bet decisions. This result would suggest that slot machines which are structurally designed to encourage or incentivise players to place large bets in the early stages of play may be more likely to lead a player to sustain a pattern of placing large bets.

Less than a third of participants (28.1 %) chose to continue monetary gambling beyond the mandatory 50 spins which suggests that behavioral persistence was not influenced by the experimental manipulations of this study. This may suggest that practice modes affect the nature of gambling behavior but do not necessarily sustain players to gamble for longer periods. However, it is possible that participants were motivated to finish the study as quickly as possible. Gamblers engaged with a less “artificial” slot machine and setting (i.e., playing a machine not created in a laboratory and used solely for research purposes) may have been more inclined to gamble for a longer period. This possibility is supported

by feedback from numerous participants, including comments such as “the practice mode was too long.” In this sense, restrictions on player choice as a necessity of experimental design may have affected player motivation and associated behavioral persistence.

### Limitations

Several methodological issues should be taken into account in interpreting these results. First, although a majority of participants in this sample were aged 18–24, i.e., a demographic identified as vulnerable to developing gambling-related problems (Derevensky and Gupta 2007; Hardoon and Derevensky 2002), the majority of participants were recruited from a university setting. This approach may have limited the generalizability of findings to non-university students within this age group who are likely to differ on a number of demographics such as education level, socioeconomic status and ethnicity. Further, as only a small number of participants in this sample reported to gamble regularly, these findings may not generalise to more experienced gamblers.

Although this study involved monetary gambling, it is inherently difficult to simulate the risk and excitement of real gambling in a laboratory setting. As one participant commented “I was not playing with my own money so I felt as if I could take more risks without any real loss.” Such feedback highlights a critical issue of ecological validity in research studies on gambling. Another issue is that the structural design of a slot machine in experimental research must be kept relatively straight-forward in order to enable effective manipulation of machine presentation and gaming features. However, an overly simplistic structural design may alter or constrain players’ preferred style of gambling. In our study, it is possible that participants would have gambled in more risky ways if given the opportunity. As one participant reported: “the machine type was too basic, it was too hard to make large gambles that pay off well”. Similarly, another participant commented that “I may have enjoyed it more if the machine was more current, and had 5 reels, multiple lines, free game features.” Although there may be significant challenges in employing complex structural designs for the purpose of evaluating individual features, future studies may benefit from inclusion of additional features to increase the general appeal and ecological validity of a gaming simulation.

### Recommendations and Future Directions

Future research on the potential risks of online practice modes could lead in several directions. Although this study did not identify pop-up messages as an influence on monetary gambling behaviors, the messages, emails and advertisements that often accompany internet gambling in-game have been highlighted as a contributing factor to gambling that warrants further attention (McMullan and Kervin 2012; Sevigny et al. 2005). Further studies on simulated gambling should focus on problem gamblers and/or regular online gamblers. Although ethical dimensions need to be considered carefully, future studies may involve assessing participants’ gambling with their own money. As noted by Walker (1992), this approach may greatly enhance ecological validity by more closely simulating the excitement and risk of real gambling. Ecological validity could be further enhanced by employing more realistic and interactive gambling simulations.

Numerous researchers have embraced computer software to develop simulated gambling activities that allow strict experimental control, particularly as the activity of gambling has itself become more electronically based (i.e., Maclin et al. 2007; Weatherly and Brandt 2004). To this researcher’s knowledge; however, this gambling study was the first

to allow participants to access the activity online rather than requiring participants to be physically present in a laboratory setting. Although an online approach reduces experimenter control, this method may enable recruitment and target specific populations (e.g., internet-only gamblers) that may be difficult to access using other methods.

## Conclusion

This study demonstrated that exposure to inflated RTP rates during a practice gambling phase may enhance risk-taking behavior in subsequent monetary gambling. This finding highlights the need for regulation to ensure that online gambling operators are accurately representing their gambling activity in “free play” or demo modes in order to protect vulnerable players. More generally, internet gambling policymakers need to more deeply consider the range and impact of practice modes. One possible measure to increase consumer safety and trust would be to introduce a recognised standard for internet gambling practices, including gambling in free play modes. Unfortunately, the online gambling environment is characterised by unregulated and unscrupulous gambling operators that exist outside effective jurisdictional powers, therefore such measures may be too difficult to implement or police effectively. As noted by Smeaton and Griffiths (2004), report that many players (particularly those who are inexperienced) may not be aware that “winning virtual money in a practice mode does not necessarily mean that [they will] win when playing for money” (p. 55).

In an uncertain online playing environment, there may be some players who would benefit from access to information about simulated gambling, such as weblinks. Given that risky gambling behavior can develop during gambling with virtual currency (i.e., prior to a transition to monetary gambling) there may be a need for inclusion of helplines or help-groups advertised in the demo mode section. Although there is no clear consensus on the prevalence rate of underage gambling in simulated gambling activities (due to the ease of misrepresentation of one’s age when online), it may be necessary for regulators to consider the requirement of more stringent barriers to entry for simulated gambling activities. As gambling activities continue to become increasingly accessible and available within digital and social technologies, there remains a constant need for researchers, clinicians and regulators to be vigilant to the potential risks that new gambling activities pose to vulnerable segments of the gambling population.

## References

- Bednarz, J., Delfabbro, P. H., & King, D. L. (2013). Practice makes poorer: Practice gambling modes and their effects on real-play in simulated roulette. *International Journal of Mental Health and Addiction, 11*, 381–395.
- Delfabbro, P. H., & King, D. L. (2012). Gambling experiences, problems, research and policy: Gambling in Australia. *Addiction, 107*, 1555–1561.
- Derevensky, J. L., & Gupta, R. (2007). Internet gambling amongst adolescents: A growing concern. *International Journal of Mental Health and Addiction, 5*, 93–101.
- Derevensky, J., Sklar, A., Gupta, R., & Messerlian, C. (2010). An empirical study examining the impact of gambling advertisements on adolescent gambling attitudes and behaviors. *International Journal of Mental Health Addiction, 8*, 21–34.
- Dowling, N., Smith, D., & Thomas, T. (2005). Electronic gambling machines: Are they the ‘crack cocaine’ of gambling? *Addiction, 100*, 33–45.

- Ferris, J., & Wynne, H. (2001). The Canadian problem gambling index: user's manual. *Toronto (ON): Canadian centre on substance abuse*. Retrieved from <http://www.ccsa.ca/Pages/Splash.htm>.
- Gainsbury, S. (2010). Response to the productivity commission inquiry report into gambling: Online gaming and the interactive gambling act. *Gambling Research*, 22, 3–12.
- Griffiths, M. D. (1999). Gambling technologies: Prospects for problem gambling. *Journal of Gambling Studies*, 15, 265–283.
- Griffiths, M. D., King, D. L., & Delfabbro, P. H. (2009). Adolescent gambling-like experiences: Are they a cause for concern? *Education and Health*, 27, 27–30.
- Griffiths, M., & Parke, J. (2010). Adolescent gambling on the internet: A review. *International Journal of Adolescent Medicine and Health*, 22, 59–75.
- Griffiths, M., & Wood, R. (2000). Risk factors in adolescence: The case of gambling, videogame playing and the Internet. *Journal of Gambling Studies*, 16, 199–225.
- Hardoon, K. K., & Derevensky, J. L. (2002). Child and adolescent gambling behaviour: Current knowledge. *Clinical Child Psychology and Psychiatry*, 7, 263–281.
- Ipsos MORI. (2009). *British survey of children, the National Lottery and Gambling 2008–2009: Report of a quantitative survey*. Retrieved from <http://www.natlotcomm.gov.uk/assetsuploaded/documents/Children%20and%20gambling%20FINAL%20VERSION%20140709.pdf>.
- King, D. L., Delfabbro, P. H., Derevensky, J. L., & Griffiths, M. D. (2012). A review of Australian classification practices for commercial video games featuring simulated gambling. *International Gambling Studies*, 12, 231–242.
- King, D. L., Delfabbro, P., & Griffiths, M. (2010). The convergence of gambling and digital media: Implications for gambling in young people. *Journal of Gambling Studies*, 26, 175–187.
- King, D. L., Delfabbro, P. H., Kaptsis, D., & Zwaans, T. (2014). Adolescent simulated gambling via digital and social media: An emerging problem. *Computers in Human Behavior*, 31, 305–313.
- Ladd, G. T., & Petry, N. M. (2002). Disordered gambling among university-based medical and dental patients: A focus on Internet gambling. *Psychology of Addictive Behaviours*, 16, 76–79.
- MacLin, O. H., Dixon, M. R., Daugherty, D., & Small, S. L. (2007). Using a computer simulation of three slot machines to investigate a gambler's preference among varying densities of near-miss alternatives. *Behavior Research Methods*, 39, 237–241.
- McBride, J., & Derevensky, J. (2009). Internet gambling behaviour in a sample of online gamblers. *International Journal of Mental Health and Addiction*, 7, 149–167.
- McMullan, J., & Kervin, M. (2012). Selling Internet gambling: Advertising, new media and the content of poker promotion. *International Journal of Mental Health Addiction*, 10, 622–645.
- McMullan, J. L., Miller, D. E., & Perrier, D. C. (2012). "I've seen them so much they are just there": Exploring young people's perceptions of gambling in advertising. *International Journal of Mental Health and Addiction*, 10, 829–848.
- Monaghan, S., Derevensky, J., & Sklar, A. (2008). Impact of gambling advertisements and marketing on children and adolescents: Policy recommendations to minimize harm. *Journal of Gambling Issues*, 22, 252–274.
- Novemsky, N., & Kahneman, D. (2005). How do intentions affect loss aversion? *Journal of Marketing Research*, 42, 139–140.
- Peller, A. J., LaPlante, D. A., & Shaffer, H. J. (2008). Parameters for safer gambling behaviour: Examining the empirical research. *Journal of Gambling Studies*, 24, 519–534.
- Productivity Commission (2010). *Gambling*. (50). Canberra: AusInfo. Retrieved from <http://www.pc.gov.au/gsp/rogs/2010>.
- Sevigny, S., Cloutier, M., Pelletier, M. F., & Ladouceur, R. (2005). Internet gambling: misleading payout rates during the "demo" period. *Computers in Human Behaviour*, 21, 153–158.
- Tversky, A., & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, 5, 297–323.
- Volberg, R., Gupta, R., Griffiths, M. D., Olsson, D., & Delfabbro, P. H. (2010). An international perspective on youth gambling prevalence studies. *International Journal of Adolescent Medicine and Health*, 22, 3–38.
- Walker, M. B. (1992). Irrational thinking among slot machine players. *Journal of Gambling Studies*, 8, 245–288.
- Weatherly, J. N., & Brandt, A. E. (2004). Participants' sensitivity to percentage payback and credit value when playing a slot-machine simulation. *Behaviour and Social Issues*, 13, 33–50. Retrieved from <http://www.uic.edu/htbin/cgiwrap/bin/ojs/index.php/bsi>.
- Wood, R., & Williams, R. (2007). Problem gambling on the internet: Implications for internet gambling policy in North America. *New Media Society*, 9, 520–542.