ORIGINAL PAPER

Gambling Motivations, Money-Limiting Strategies, and Precommitment Preferences of Problem Versus Non-Problem Gamblers

Lia Nower · Alex Blaszczynski

Abstract Studies attempting to identify the specific 'addictive' features of electronic gaming machines (EGMs) have yielded largely inconclusive results, suggesting that it is the interaction between a gambler's cognitions and the machine, rather than the machine itself, which fuels excessive play. Research has reported that machine players with gambling problems adopt a number of erroneous cognitive perceptions regarding the probability of winning and the nature of randomness. What is unknown, however, is whether motivations for gambling and attitudes toward pre-session monetary limit-setting vary across levels of gambling severity, and whether proposed precommitment strategies would be useful in minimizing excessive gambling expenditures. The current study explored these concepts in a sample of 127 adults, ages 18 to 81, attending one of four gambling venues in Queensland, Australia. The study found that problem gamblers were more likely than other gamblers to play machines to earn income or escape their problems rather than for fun and enjoyment. Similarly, they were less likely to endorse any type of monetary limit-setting prior to play. They were also reticent to adopt the use of a 'smart card' or other strategy to limit access to money during a session, though they indicated they lost track of money while gambling and were rarely aware of whether they were winning or losing during play. Implications for precommitment policies and further research are discussed.

Keywords Pathological gambling · Problem gambling · Precommitment · Money attitudes · Gaming machines · Addictions · Impulse control disorders · Smart cards · Harm reduction

L. Nower (✉)
Center for Gambling Studies, Rutgers University, 536 George Street, New Brunswick, NJ 08901, USA
e-mail: lnower@rutgers.edu

A. Blaszczynski
School of Psychology, University of Sydney, Sydney, NSW 2006, Australia
e-mail: a.blaszczynski@usyd.edu.au

Introduction

Electronic gaming machines (EGMs) are associated with the highest rates of problem gambling (Breen and Zimmerman 2002; Cox et al. 2000; Productivity Commission 1999), particularly among some sub-groups such as women (Petry 2003); ethnic minorities (Nower and Blaszczynski 2006); older adults (Nower and Blaszczynski 2008); and veterans (Biddle et al. 2005).

It is hypothesized that the effects of operant conditioning, combined with promises of a larger pay-out with longer periods of play, lead to the habituation and maintenance of gambling behaviour in the face of escalating losses. Studies have reported that problem gambling is correlated with particular structural characteristics of machines: faster speeds of play, number of available lines, and sound (Delfabbro et al. 2005); high-denomination note acceptors and maximum bet size (Sharpe et al. 2005); and the phenomenon of 'near wins' (Côté et al. 2003). As Blaszczynski et al. (2005) have noted, however, efforts to minimize harm through altering features (e.g., slowing down reel spin) do not reduce intentions to continue gambling, suggesting there is a more complex explanation for higher rates of problem gambling among machine players.

If machines are not inherently 'addictive' in their own right, then one could argue that some interaction between individuals and machines may contribute to differences in play between recreational and problem gamblers. For example, Côté et al. (2003) found that problem gamblers were more likely than other gamblers to believe they nearly missed a winning combination based on a visual representation on the screen, suggesting that erroneous interpretations of visual stimuli rather than the stimuli themselves were responsible for persistence in gambling. Such cognitive distortions could be due to the fact that the desire to win money fuels illogical perceptions, which, in turn, reinforce notions that winning is possible.

For many gamblers, the prospect of winning money and their attitudes to money represent important determinants of motivation and governance over the intensity to gamble. Problem gambling behaviour results, in part, from misconceptions that gambling is a source of income that has the potential to change one's life dramatically and without effort (Walker 1992). A number of studies have identified the desire to win money as a primary motivation for gambling, particularly among problem gamblers (Ladouceur et al. 2002; Neighbors et al. 2002; Park et al. 2004; Wood et al. 2004). In the cognitive framework, irrational beliefs, erroneous perceptions, and misunderstanding concepts of randomness, mutual independence of chance events and probabilities lead to an over-inflated estimate of the likelihood of winning, which leads to excessive expenditures (Gaboury and Ladouceur 1989; Manoso et al. 2004).

One critical and previously unexplored area of research involves determining whether adopting a pre-session spending limit would decrease the money spent gambling irrespective of cognitive distortions during play. Are problem gamblers less likely than recreational gamblers either to set or to adhere to pre-session spending limits? Do recreational gamblers adopt different limit-setting approaches that make them more likely than problem gamblers to succeed in limiting losses? Even absent pre-session strategies, do problem gamblers differ from recreational gamblers in their attitudes toward externally-imposed precommitment requirements?

Some proposed precommitment strategies (Dickerson and O'Connor 2006) suggest that, prior to entering a gambling venue, gamblers be required to deposit pre-determined amounts of money on 'smart cards,' which contain a magnetic strip, memory, or microprocessor function that stores information, extracted or transferred in electronic form.

These authors argue that gamblers should make such purchases in the context of 'cold emotions' (i.e., outside gambling venues before play) with the deliberate intent of limiting amounts to affordable levels. The gambler would then use the smart-cards to play the gaming machines or to obtain chips to gamble, thereby distancing him/herself from money at two levels: the initial transfer of funds to the smart-card and the use of smart-cards to obtain tokens or to gamble. However, in a study of 134 patrons of Australian clubs with cashless, card-based systems, Nisbet (2005) reported that a majority of electronic gaming machine players (70%, $n = 93$) reported they did not use the cards. In addition, 61.2% ($n = 82$) of respondents were either ambivalent about using the system or indicated that the system would not help them manage their spending (Nisbet 2005).

The primary objective of precommitment is to set a pre-determined limits on expenditures, which, theoretically, the gambler is unable to exceed; any attempt to overspend would force a break in play, maximizing the opportunity for a 'cooling off' period during which the gambler could reconsider decisions to continue play in a less emotionally charged frame of mind. What remains unknown is whether the unintended effect of increasing the distance between money and the individual would result in the 'tokenization' of money, thereby decreasing its value and leading to increased expenditures on gambling. Similarly, it is also possible that an individual required to purchase a smart-card would precommit more money than s/he would normally spend gambling to ensure that s/he would have sufficient funds to fully enjoy an evening of play.

As regulators explore means of decreasing the adverse impacts of gambling on problem gamblers, strategies featuring smart cards or the addition of computerized card readers that enforce pre-set limits to machines have emerged as attractive options for harm reduction. However, to date, there is no peer-reviewed empirical research that indicates that these strategies would prove effective for problem gamblers. The limited research that exists largely utlizes proprietary data, funded or conducted by the vendors of software or computerized products, which is not subject to replication and review by other researchers. Such data has obvious limitations: It relies on self-reports of volunteers who utilize the product but who may or may not be problem gamblers and fails to account for the unknown proportion of gamblers who might test the product but would never choose to use it in a real gambling session. Also, reports of these evaluations are not submitted to objective, scientific peer review.

The purpose of the present study is to explore the relationship of gamblers' pre-session gambling strategies to their perceptions of precommitment across levels of problem gambling severity. Specifically, the study aims to compare non-problem, low-risk, moderate-risk, and problem gamblers with respect to: (a) motivations for playing machines; (b) pre-session monetary limit-setting strategies; and (c) attitudes toward proposed precommitment strategies on limiting gambling expenditures.

Methodology

Participants

Participants were 127 patrons, recruited as they entered the gaming area of one of four venues in the Brisbane metropolitan area in Queensland. Research assistants approached consecutive patrons who entered the gaming area and asked them to participate. Each of the venues was highly trafficked, with a number of entrances/exits, and offered a wide range of services in addition to gambling (e.g., restaurant, bar). Therefore, it was not

possible to randomly recruit participants or to calculate an overall response rate, that is, the number of potential participants as compared to those who participated in the study. Venue employees were not involved in recruitment for the study. Patrons agreeing to participate were given a written information sheet describing the purpose of the study and signed a written consent form, approved by the ethics review board at the University of Sydney. Participants received no compensation for participating in the study.

Measures

Participants completed a series of pen-and-paper questionnaires in a private area near the entrance to the gaming floor. The questionnaire should include items assessing reasons for gambling, demographics, and preferred gambling activities. The questionnaire also included a section of questions, designed by the authors to measure gamblers' perspectives on precommitment strategies, including: (a) willingness to gamble with precommitted money; (b) the perceived effectiveness of precommitment on limiting gambling expenditures; (c) compensatory strategies for precommitment; (d) funding preferences; and (e) overall perceptions of money-related harm reduction strategies.

Participants were provided with a general definition of a smart card that consisted of the following statement:

> Smart Cards are used in place of cash (coins or notes) when you are playing poker-machines. They are usually the size of credit cards and have a magnetic strip or chip that records an amount of money that is available to you, much like a pre-paid phone card. To use it, you insert the smart card into the electronic gaming machine, which then allows you to play the amount of money that you have on the card. Wins are automatically added, and losses taken away during play. Smart cards can be refillable, allowing you to add more cash, or sold in a non-refillable preset amount.

Participants were then asked questions regarding: (a) their perceptions of the effectiveness of smart cards in limiting losses or assisting gamblers to set limits; (b) their beliefs about factors that influence losses (using cash and tokens or chips, losing track of money etc.); and (c) the conditions that would dictate whether or not the participant would use a smart card.

Problem gambling severity was assessed using the *Problem Gambling Severity Index (PGSI) of the Canadian Problem Gambling Index (CPGI)*, (Ferris and Wynne 2001). The PGSI is a 9-item subscale, assessing two key areas of problem gambling severity: problem gambling behaviours and consequences within a 12 month time-frame. The CPGI has received extensive psychometric testing (Ferris and Wynne 2001) with good reliability and sound internal consistency showing a Chronbach's alpha of 0.84, and test–retest reliability of 0.78, and good convergent validity correlating 0.83 with the SOGS and DSM-IV classifications of problem gambling.

Statistical Analysis

All analyses were conducted using SPSS Version 15.0 for Windows. Bivariate tests (Pearson Chi-square, ANOVA, and ANCOVA) assessed the relationships between independent variables and problem gambling severity categories from the CPGI (non-problem, low-risk, moderate-risk, and problem). Variables included gender and age (demographics), gambling preferences (amount spent gambling, times gambled per month, favourite gambling form, reasons for playing machines), and attitudes (limit-setting, smart cards, money).

Results

The sample ($N = 127$) ranged in age from 18 to 81 years ($M = 39.91$, $SD = 14.91$). More than twice as many men (71.4%; $n = 90$) as women (28.6%; $n = 36$) participated in the study. By gender, women were significantly older, ranging in age from 19 to 81 years, with a mean age of 44 years ($SD = 16.31$); men ranged from 18 to 75 years with an average age of 38 years, $F (1,126) = 4.96$, $P = 0.028$.

Participants were grouped according to the categorization scheme proposed by the CPGI: non-problem gamblers ($n = 62$; 48.8%), low-risk gamblers ($n = 25$; 19.7%), moderate-risk ($n = 20$; 15.7%), and problem gamblers ($n = 20$; 15.7%). There were no significant differences by gender, $\chi^2(3,124) = 4.32$, $P = 0.23$, or age, $F (3,124) = 1.59$, $P = 0.20$, across gambling groups.

Overall, participants reported spending (all amounts expressed in Australian dollars) an average of nearly $71 ($SD = \$130.25$) per session, with the median amount gambled of $20 per session. As shown in Table 1, this disparity is largely accounted for by the difference in expenditures between non-problem and problem gamblers. In contrast to non-problem gamblers, who reported spending an average of $32 on electronic gaming machines an average of three times a month, problem gamblers reported spending an average of $185 per occasion and playing an average of seven times per month (Table 1).

Participants reported attending venues an average of four times a month (Mean = 4.11, $SD = 5.07$). Though all differences were non-significant by gender, females, on average, reported spending more money per session than males on EGMs ($92.14 vs. $62.05), despite playing fewer times per month on average (Females: Mean = 3.46, $SD = 5.08$; Males: Mean = 4.45, $SD = 5.083$).

Participants were asked to endorse their favorite form of gambling from a list of eight activities: electronic gaming machines, video-card games (blackjack, poker, and keno), keno, betting on horses (dogs, trots), casino table games (roulette, blackjack, baccarat etc.), sports betting, lottery and scratch cards (Table 2).

Both problem and moderate-risk gamblers endorsed preferences for playing EGMs, followed by betting on horses (dogs, trots), and table games. In contrast, low-risk gamblers indicated a preference for EGMs, betting on horses (dogs, trots), and keno. Only non-problem gamblers indicated that their first preference was lottery, followed by EGMs and betting on horses (dogs, trots). Overall, problem gamblers were more likely than non-problem gamblers to prefer machines, $\chi^2(1,82) = 7.50$, $P = 0.006$, and less likely to play the lottery, $\chi^2(1,82) = 8.53$, $P = 0.003$. Other between-group differences were non-significant.

Reasons for Playing Machines

Participants were asked to endorse their primary reasons for playing EGMs. Problem gamblers differed significantly from other groups regarding the motivations of excitement/ entertainment, income generation, and escape (see Table 3). Compared to non-problem and moderate-risk gamblers, problem gamblers were more likely to report they played machines because it was exciting and entertaining, $F (3,118) = 9.85$, $P < 0.0001$. Compared to non-problem gamblers, problem gamblers were more likely to report that machine play was a way to earn income, $F (3,118) = 3.43$, $P = 0.02$, and to help them escape their problems, $F (3,118) = 4.19$, $P = 0.007$. There were no between group differences for any response category when controlling for age or gender. All post-hoc analyses were conducted using the Tukey pairwise comparison at an alpha level of 0.05.

Table 1 Demographic characteristics of non-problem, low-risk, moderate-risk, and problem gamblers

Variable	Non-problem gamblers (n = 62) N (%)		Low-risk gamblers (n = 26) N (%)		Moderate-risk gamblers (n = 20) N (%)		Problem gamblers (n = 19) N (%)	
Gender								
Male	39 (62.9)		19 (76.0)		17 (85.0)		15 (75.0)	
Female	23 (37.1)		7 (24.0)		3 (15.0)		9 (25.0)	
	Mean ± SD	Median (Range)	Mean ± SD	Median (Range)	Mean ± SD	Median (Range)	Mean ± SD	Median (Range)
Age	42.6 ± 16.5	40.0 (18–18)	39.4 ± 14.0	38.0 (20–63)	34.8 ± 9.6	32.0 (19–49)	37.2 ± 14.2	34.5 (22–70)
Times gamble per month	2.6 ± 4.3[a]	1.00 (0–25)	5.0 ± 4.5	4.0 (1–24)	5.1 ± 3.8	4.0 (0–15)	7.1 ± 7.3[a]	5.0 (0–30)
Amt. spent per visit	31.7 ± 56.4[a]	20.0 (0–350)	74.2 ± 106.6	40.0 (5–500)	87.2 ± 102.0	50.0 (0–400)	185.1 ± 259.2[a]	100.0 (0–1000)

[a] Problem gamblers gambled more times per month ($P = 0.007$) and spent more money per visit on machines ($P \leq 0.001$) than non-problem gamblers

Table 2 Preferred gambling activities by gambling group

	Non-problem gambler (n = 58)		Low-risk gambler (n = 25)		Moderate-risk gambler (n = 20)		Problem gambler (n = 19)	
	No.	%	No.	%	No.	%	No.	%
EGMs	19	30.6*	14	56.0	12	60.0	13	65.0*
Video card games	0	0.0	0	0.0	0	0.0	1	5.0
Keno	11	17.7	5	20.0	2	10.0	2	10.0
Horse, dogs, trots	12	19.4	10	40.0	4	20.0	6	30.0
Table games	10	16.1	4	16.0	3	15.0	3	15.0
Sports betting	2	3.2	1	4.0	1	5.0	0	0.0
Lottery	20	32.3*	4	16.0	2	10.0	0	0.0*
Scratchcards	7	11.3	4	16.0	0	0.0	0	0.0

* Problem gamblers were more likely than non-problem gamblers to endorse machines ($P = 0.006$) and less likely to endorse lottery play ($P = 0.003$)

Table 3 Primary reasons for gambling on electronic gaming machines

	Non-problem gambler (n = 58)		Low-risk gambler (n = 25)		Moderate-risk gambler (n = 20)		Problem gambler (n = 19)	
	No.	%	No.	%	No.	%	No.	%
For fun & enjoyment	40	64.5	18	72.0	15	75	8	42.1
Because it's exciting and entertaining	1	1.6[a]	6	24.0	3	15[a]	9	47.4
To socialize with others	7	11.3	6	24.0	2	10	3	15.8
To earn additional income	2	3.2[b]	3	12.0	1	5.0	5	26.3
To get away from daily hassles and problems	5	8.1[b]	4	16.0	3	15.0	8	42.1

[a] Problem gamblers versus non-problem ($P < 0.001$) and moderate risk ($P < 0.001$)

[b] Problem gamblers versus non-problem ($P = 0.02$ and escape ($P = 0.007$)

Pre-Session Limit-Setting

Participants were asked how or if they set limits for themselves before or during play when they played machines. Problem gamblers differed from all other groups regarding their strategies for play, $F (3,120) = 12.93$, $P < 0.0001$.

Problem gamblers were less likely than all other groups to endorse any form of pre-commitment or limit-setting prior to play. They were significantly more likely than non-problem, $\chi^2(1,81) = 26.05$, $P \leq 0.001$, and moderate-risk gamblers, $\chi^2(1,39) = 9.63$, $P = 0.002$, to indicate they usually decided how much to play with when they started play but failed to set any limits. In addition, they were more likely than non-problem gamblers to report that they either let the situation dictate how much they would spend on play, $\chi^2(1,81) = 6.14$, $P = 0.030$, or decided how much to spend based on how much they were behind (i.e., chasing motivation), $\chi^2(1,81) = 6.14$, $P = 0.030$.

In contrast, significantly more non-problem as compared to moderate-risk, $\chi^2(1,81) = 7.09$, $P = 0.008$, or problem gamblers, $\chi^2(1,81) = 4.51$, $P = 0.034$, reported that they set specific money limits for play and stuck to those amounts. Low-risk gamblers were also more likely than moderate-risk gamblers to establish limits before play,

$\chi^2(1,44) = 3.97$, $P = 0.047$. Similarly, moderate-risk gamblers were more likely than all groups to indicate that they knew roughly how much they planned to spend at the start of play (non-problem: $\chi^2(1,80) = 10.33$, $P = 0.001$; low-risk: $\chi^2(1,44) = 5.23$, $P = 0.022$; problem: $\chi^2(1,39) = 12.80$, $P = \le 0.001$). There were no statistically significant between-group differences among participants who indicated they decided how much to spend after the start of play but set firm limits, $\chi^2(3,122) = 2.97$, $P = 0.397$.

Precommitment Strategies

Participants were ask to rate their agreement with a series of questions on a 7-point Likert scale, ranging from "Strongly Disagree" to "Strongly Agree." Mean scores for questions with significant statistical between-group differences, controlling for age and gender, are reported in Table 4.

In contrast to other groups, problem gamblers expressed more reluctance about using smart cards unless they were able to access additional funds. Problem gamblers were significantly more likely than both non-problem and low-risk gamblers to indicate that they would buy another smart card if they ran out of funds and wanted to chase a loss, $F(3,119) = 9.43$, $P < 0.0001$, or that they would only use a smart card if they had the option to buy another card if it ran out in order to continue gambling, $F(3,119) = 5.20$, $P = 0.002$.

In contrast to non-problem gamblers, problem gamblers were more likely to report they would prefer a refillable smart card, rather than one with a preset amount, $F(3,114) = 3.02$, $P = 0.033$. Problem gamblers were more likely than all other groups to indicate they lost track of money while gambling, $F(3,116) = 15.60$, $P < 0.0001$, and more likely than moderate-risk gamblers to report they were seldom aware whether they were winning or losing during a gambling session, $F(3,116) = 8.84$, $P = 0.012$, though they were reticent to endorse the use of smart cards as a means of setting limits or limiting losses.

Contrary to expectations and the concept of 'tokenization,' problem gamblers did not spend significantly more money than non-problem gamblers when using tokens or chips as compared to cash.

Discussion

Consistent with research regarding the role of erroneous cognitions in gambling, the primary motivation for gambling proved to be a fundamental distinction between problem and non-problem gamblers in this study. Although a high proportion of all gambling groups indicated that gambling was fun and enjoyable, a higher statistically significant proportion of problem gamblers, as compared to non-problem gamblers, reported that playing EGMs was a way to earn income or to escape problems. In contrast, non-problem gamblers endorsed fun/enjoyment and socialization as the two primary motivations for gambling. These findings highlight the fact that non-problem gamblers gamble for recreational purposes and regard EGM play as one of many forms of available entertainment.

Those who develop gambling problems, however, are more likely to entertain cognitive misperceptions regarding the nature of randomness and chance events or the ability to control the gambling outcome because they view gambling as an income-generating activity. Similarly, the findings support research that suggests problem gamblers use gambling, in part, to escape or avoid aversive mood states such as underlying depression

Table 4 Attitudes toward smart cards (SC)

	Non-PG M (SD)	Low-risk M (SD)	Moderate-risk M (SD)	Problem gambler M (SD)
If I could only bet the amount I put on my SC, I would be likely to put more money on it just in case I needed extra to gamble	2.64 (2.03)[b]	3.32 (2.41)	3.50 (2.26)	4.10 (2.51)[b]
Even if I had a SC, I would buy another one if I lost and wanted to try to win	1.95 (1.63)[a]	2.08 (1.78)[a]	3.05 (1.99)	4.35 (2.37)[a]
I usually spend more money when I'm using tokens or chips than when I'm playing with cash	2.47 (1.95)	2.88 (2.23)	3.21 (2.02)	3.58 (2.43)
I would only use a SC if I had the option to buy another one to continue gambling if it ran out	2.28 (1.80)[a]	2.36 (1.73)[a]	2.75 (1.83)	4.15 (2.35)[a]
I often lose track of how much money I spend on play	1.57 (1.28)[c]	2.16 (1.55)[c]	2.80 (1.61)[c]	4.32 (2.14)[c]
If I had a choice, I would buy a SC I could refill with more cash rather than one that is only good for one preset amount	2.41 (1.90)	3.00 (2.30)	3.21 (2.23)	4.05 (2.37)
The display on electronic gaming machines showing the cash amount rather than credit points helps me stick to my limits	4.70 (2.28)	4.79 (2.15)	4.05 (2.48)	4.00 (2.31)
I usually do not figure out if I am in front or behind while in the middle of a session when playing the machines	2.66 (1.94)	2.52 (2.04)	2.05 (1.28)[d]	4.05 (2.39)[d]
Using SC would change how much I gambled on an electronic gaming machine	2.12 (1.82)	3.72 (2.34)	3.20 (1.99)	3.05 (2.30)

ANCOVA, controlling for gender, age

[a] Problem versus non-problem and low-risk ($P < 0.0001$)

[b] Problem versus non-gamblers ($P = 0.033$)

[c] Problem versus all groups ($P < 0.0001$)

[d] Low-risk versus moderate-risk gamblers ($P = 0.012$)

and/or anxiety (Blaszczynski and Nower 2002; Jacobs 1986). For these gamblers, the activity functions as a 'drug' (Lea and Webley 2006) rather than merely as an activity, increasing the likelihood that individuals will continue to gamble to prolong alternations in underlying affective states.

These results are consistent with the limit-setting practices reported by participants. Non-gamblers in the study indicated they set specific money limits before play and stuck to those amounts. Similarly, low-risk gamblers were more likely than moderate-gamblers to establish limits before play, while moderate-risk gamblers had only a 'rough' indication of how much they would spend prior to play. Problem gamblers were the least likely group to endorse any form of precommitment or limit-setting prior to play. They indicated they failed to set any limits at the start of play and then either let the situation dictate how much they would spend or decided how much to spend based on how much they were behind (i.e., chasing). Subsequent studies are needed to investigate whether gamblers actually engage in the self-reported limit-setting behaviors they report.

These results establish a positive, linear relationship between gambling problem severity and specific limit-setting before the start of a gambling session and suggest two potential explanations in need of further exploration. One could hypothesize that gamblers

who thoughtfully consider how much they can afford to spend and set comfortable limits before gambling are less likely to succumb to erroneous perceptions about winning when faced with losses that exceed those limits. Therefore, requiring precommitment before play would ensure that those who would not otherwise consider pre-session limits would be required to do so and, thereby, be less likely to overspend. Alternatively, the findings could suggest that individuals who are gambling for reasons besides entertainment (e.g., to escape aversive mood states, to earn money) fail to consider limit-setting not because they are in need of education or an opportunity to do so, but because their primary consideration is to continue gambling irrespective of the consequences. For those gamblers, it is unlikely that precommitment would make an appreciable difference in gambling losses, because those gamblers would likely find an alternative venue or means of obtaining credit to continue gambling.

The study findings, exploring attitudes toward precommitment strategies, provide preliminary support for the latter hypothesis. Problem gamblers expressed more reluctance than other groups about using smart cards, though they readily indicated they lost track of money while gambling and were rarely aware of whether they were winning or losing. They indicated they would only use a smart card if: (a) such cards were refillable, and they were either (b) able to access additional funds as needed or (c) allowed to purchase an additional card if they ran out of funds and wanted to chase a loss. These responses suggest that precommitment would have little effect on decreasing gambling expenditures among those who were intent on continued gambling, because they would likely find a means of obtaining additional cards or seek out venues where refills or other options were available. Whether precommitment would have a protective effect for non-problem or low-risk gamblers who might otherwise proceed to more serious levels of gambling would require further research.

Contrary to the concept of 'tokenization,' there were no between-group differences in gambling expenditures based on the use of tokens, chips, or cash. Findings seem to indicate that using a smart card would not lead gamblers to precommit additional funds to ensure they had enough for gambling. In addition, it appears that the use of smart cards would not be associated with a tendency to gamble more when playing with tokens or cards than they do when playing with actual cash. However, more empirical testing is required to support these conclusions.

This study has several limitations. Participants were a convenience sample of EGM players at four venues in Queensland, Australia who agreed to take the survey before commencing play. Findings, therefore, may not generalize to other EGM players in other venues and locations. In addition, the survey was self-administered in an area of the venue, which may have resulted in problems of recall, selective bias, and other methodological problems that typify this type of research.

Despite these limitations, however, the study is the first to explore gambling motivations in the context of pre-session monetary limit-setting strategies and attitudes toward precommitment as a means of limiting gambling expenditures. An increasing number of manufacturers are marketing proprietary software and computer devices for precommitment without scientific evidence that such innovations will, in fact, decrease gambling expenditures among problem gamblers or arrest the progression toward problem gambling from those who are at low- to moderate-risk. Results of the current study suggest that those most in need of limit-setting, problem gamblers, are the least likely to adopt the use of smart cards and other precommitment technologies and the most likely to find ways around limitations. Further research is needed to determine whether such strategies, designed for moderate-risk and problem gamblers, are only acceptable to those who least require

precommitment (i.e., non-problem gamblers). Additional studies should also focus on differentiating among different approaches to precommitment (e.g., smart card, card reader, software) to determine the relative effectiveness of these approaches over time in limiting gambling losses across levels of problem gambling severity and on the effect of a 'cooling-off' period created by those approaches on resulting decreases in gambling expenditure over time.

References

Biddle, D., Hawthorne, G., Forbes, D., & Coman, G. (2005). Problem gambling in Australian PTSD treatment-seeking veterans. *Journal of Traumatic Stress, 18*, 759–767.

Blaszczynski, A., & Nower, L. (2002). A pathways model of problem and pathological gambling. *Addiction, 97*, 487–499.

Blaszczynski, A., Sharpe, L., Walker, M., Shannon, K., & Coughlan, M.-J. (2005). Structural characteristics of electronic gaming machines and satisfaction of play among recreational and problem gamblers. *International Gambling Studies, 5*, 187–198.

Breen, R. B., & Zimmerman, M. (2002). Rapid onset of pathological gambling in machine gamblers. *Journal of Gambling Studies, 18*, 31–43.

Côté, D., Caron, A., Aubert, J., Descrochers, V., & Labouceur, R. (2003). Near wins prolong gambling on a video lottery terminal. *Journal of Gambling Studies, 19*, 433–438.

Cox, B. J., Kwong, J., Michaud, V., & Enns, M. W. (2000). Problem and probable pathological gambling: Considerations from a community survey. *Canadian Journal of Psychiatry, 45*, 548–553.

Delfabbro, P. H., Falzon, K. P., & Ingram, T. L. (2005). The effects of parameter variations in electronic gambling simulations: results of a laboratory-based pilot investigation. *Journal of the National Association of Gambling Studies, 17*, 7–27.

Dickerson, M. G., & O'Connor, J. (2006). *Gambling is an addictive disorder: Impaired control harm minimisation, treatment and prevention*. Cambridge: International Research Monographs in the Addictions.

Ferris, J., & Wynne, H. (2001). *The Canadian Problem Gambling Index*. Ottawa, ON: Canadian Centre on Substance Abuse.

Gaboury, A., & Ladouceur, R. (1989). Erroneous perceptions and gambling. *Journal of Social Behavior and Personality, 4*, 411–420.

Jacobs, D. (1986). A general theory of addictions: A new theoretical model. *Journal of Gambling Behavior, 2*, 15–31.

Ladouceur, R., Sylvain, C., Boutin, C., & Doucet, C. (2002). *Understanding and treating pathological gamblers*. London: Wiley.

Lea, S., & Webley, P. (2006). Money as tool, money as drug: The biological psychology of a strong incentive. *Behavioral and Brain Sciences, 29*, 161–209.

Manoso, V., Labrador, F. J., & Fernandez-Alba, A. (2004). Differences on cognitive distortions during gambling in pathological gamblers and no-gamblers. *Psicothema, 16*, 576–581.

Neighbors, C., Lostutter, T. W., Cronce, J. M., & Larimer, M. E. (2002). Exploring college student gambling. *Motivation, 18*, 361–370.

Nisbet, S. (2005). Responsible gambling features of card-based technologies. *International Journal of Mental Health and Addiction, 3*, 54–63.

Nower, L., & Blaszczynski, A. (2006). Characteristics and gender differences in casino self-excluders: Missouri data. *Journal of Gambling Studies, 22*, 82–99.

Nower, L., & Blaszczynski, A. (2008). Characteristics of gamblers ages 56 and older: A statewide study of casino gamblers who self-exclude. *Psychology and Aging, 23*, 577–584.

Park, A., Griffiths, M., & Irwing, P. (2004). Personality traits in pathological gambling: Sensation seeking, deferment of gratification and competeness as risk factor. *Addiction Research and Theory, 12*, 201–212.

Petry, N. M. (2003). A comparison of treatment-seeking pathological gamblers based on preferred gambling activity. *Addiction, 98,* 645–655.

Productivity Commission. (1999). *Australia's gambling industries*. Report no. 10. Canberra, Australia: AusInfo.

Sharpe, L., Walker, M., Coughlan, M.-J., Enersen, K., & Blaszczynski, A. (2005). Structural changes to electronic gaming machines as effective harm minimization strategies for non-problem and problem gamblers. *Journal of Gambling Studies, 21,* 503–520.

Walker, M. B. (1992). *The psychology of gambling*. Oxford: Pergamon.

Wood, R. T. A., Gupta, R., Derevensky, J. L., & Griffiths, M. (2004). Video game playing and gambling in adolescents: Common risk factors. *Journal of Child and Adolescent Substance Abuse, 14,* 77–100.