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Who Spends Money to Play for Free? Identifying Who Makes Micro-transactions on Social Casino Games (and Why)

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Abstract Social casino games are online gambling-like games found on social networking sites. They are initially free to play, however, players are encouraged to make micro-transactions (i.e., in-game purchases) for additional game credits or functionality. As a result, they generate billions of dollars in revenue. Yet, little is known as to *who* purchases virtual credits, let alone *why*. In the present research, we assessed whether there are individual differences (impulsivity, reward sensitivity, competitiveness, and problem gambling severity) between who is and who is not likely to make micro-transactions during social casino game play. Moreover, we examined possible motivations for making micro-transactions (e.g., extend play, win back lost credits) and whether the individual difference variables of interest predict reported motivation(s) for making micro-transactions. Results showed that social casino gamers who engaged in micro-transactions reported significantly higher levels of impulsivity, reward sensitivity and problem gambling severity, but not competitiveness. In terms of motivation to make micro-transactions, desire to extend play was endorsed most frequently, followed by a desire to access additional features, chasing lost credits, and to speed up play. Lastly, among participants who made micro-transactions, reward sensitivity predicted making micro-transactions to chase lost credits. These results suggest the personality make-up of social casino gamers is important to understand who is likely to make micro-transactions as well as their motivation to do so—information that could prove useful for regulation of the industry.

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Social casino games generate considerable profit for operators. Indeed, it is estimated that the industry made $3.46 billion USD in 2015—a figure that is expected to grow to $4.44 billion USD by 2017 (Eilers Research 2015). These revenues are staggering given social casino games are free to play. The manner in which the social casino gaming industry makes money lies in their *freemium* pricing strategy. The game is provided for free as are initial credits to begin play, but a monetary fee must be paid to extend play beyond the initial credits or to access proprietary features, functionality, or virtual goods. When a player makes a purchase (s)he is said to have made a micro-transaction. Of course, not everyone who plays social casino games makes micro-transactions. However, those who do tend to spend a lot. For example, the average user on Big Fish Casino spends over $200 dollars (Wells 2015). Given that the number of social casino gamers is estimated to be over 170 million (Martin 2014), micro-transactions are a key component of the engine that drives profits for the social casino gaming industry (Casual Games Association 2012).

From a public health perspective, understanding who is apt to make micro-transactions (and why) is of considerable importance. This is because excessive micro-transactions can yield significant financial loss (see Griffiths 2015; Wells 2015). They may also lead to (excessive) gambling. Kim et al. (2015), for example, showed that micro-transactions predicted the transition to online gambling among social casino gamers who had previously never gambled online. Once people start gambling, a small but significant portion will develop problematic gambling behaviors—behaviors associated with, among other things, financial and familial difficulties, crime, depression, and suicide (Fong 2005; Kim et al. 2016a; Matheson et al. 2009; Petry et al. 2005). Yet, little is known about who is and who is not willing to make micro-transactions. The current research aimed to address this empirical gap in a community sample of social casino gamers.

The Nature of Social Casino Games

Social casino games are among the most popular games on social media sites and currently boast over 173 million users worldwide (Martin 2014). The popularity of social casino games may stem in part from the fact that each social casino game is constructed to have similar structural characteristics with their gambling counterparts (Bramley and Gainsbury 2015). For example, social casino slot machine games (e.g., Slotomania) have similar visual features (e.g., 3 or 5 spinning reels) and auditory stimuli (e.g., sound of reels spinning, sirens following a big win) as slots machines in land-based and online casinos—features and stimuli that are positively reinforcing and thus promote further use of the game (see Bramley and Gainsbury 2015; Derevensky et al. 2013). Perhaps unsurprisingly, there is a great deal of user overlap between social casino games and gambling games (Gainsbury et al. 2014; Gainsbury et al. 2015).

Unlike gambling, however, social casino gaming does not require monetary payment to initiate play. Indeed, they are free to access and play, at least initially. Once initial seed credits have been exhausted, payment to the operator is needed to obtain more credits in order to continue to play. Moreover, additional features, functionality, or goods can only be accessed via payment to the operator. Importantly, players are actively encouraged (via in-

game messaging) to make micro-transactions for the above noted reasons. For example, when initial seed credits are spent, players are informed that new, free credits will be deposited in a specified period of time (typically 24 h). However, players are also told that they can resume play immediately for a small fee (i.e., engage in micro-transaction). It is when players take the latter route that social casino gaming companies profit.

While previous studies have suggested only 1–5 % of social casino gamers engage in micro-transactions (Delaney 2014; Parke et al. 2013), Sinclair (2015) reported a staggering 46 % of US social casino gamers spend money to extend play and enhance their play experience. Some of these players may experience significant financial loss as a result (see Griffiths 2015). For example, one social casino gamer on Big Fish Casino spent nearly $22,000 to purchase free credits (Wells 2015). In addition to the potential financial losses, micro-transactions may also be a precursor or gateway to gambling. Kim et al. (2015), for instance, found that approximately 26 % of social casino gamers, who had previously never gambled online, reported having migrated to online gambling. Importantly for the present research, engagement in micro-transactions was the only unique predictor of this migration. Thus, micro-transactions and people's propensity to make them is far from mundane. Indeed, whilst commenting on the social casino gaming industry, Ralph Topping, CEO of William Hill (a book making company in the United Kingdom), argued that social casino gaming carries the same risks as online gambling in the development of disordered gambling (cited in Schneider 2012). Unfortunately, there is a distinct lack of knowledge about who is most likely to make micro-transactions in social casino games, to say nothing of their motivation to do so.

Who is Likely to Make Micro-transactions?

Although research on social casino games is in its infancy, clues about who is most likely to make micro-transactions can be gleaned from the extant literature on social casino gaming as well as the literature on problem gambling more broadly. First, we put forth the proposition that social casino gamers who also report elevated symptoms of problem gambling may be especially likely to make micro-transactions. This proposition is based on observations and research that suggest some people are apt to spend a lot of money on social casino games (Griffiths 2015; Wells 2015) and those people are most likely to transition to gambling (Kim et al. 2015). Moreover, people who gamble are also likely to play social casino games (Gainsbury et al. 2015). Thus, we hypothesized that people who have problems controlling their gambling expenditures should also be unlikely to refrain from making purchases on social casino games to extend play and gain access to additional features in the social casino game to increase their excitement and enjoyment.

It is also possible that social casino gamers who are highly competitive may be apt to make micro-transactions. In focus groups conducted with social media users who engage in social casino games (Kim et al. 2016b), participants noted that social casino games display leader boards that allow players to compare the number of credits in their possession to others in their social network as well as other players. They suggested that the presence of a leaderboard creates competitiveness among some social casino gamers—there is a feeling of excitement to see one's score increase relative to others. The purchase of credits via micro-transactions is one means to move up the leaderboard. In this light, social casino gamers who are highly competitive may be more apt to make micro-transactions.

Social casino games are constructed to have similar structural characteristics as their gambling game counterpart (Bramley and Gainsbury 2015). As such, factors that predict excessive gambling may also be predictive of micro-transaction purchases. According to Maccallum et al. (2007), most conceptual models of problem gambling include impulsivity as a predominate characteristic. Specifically, problem gamblers tend to exhibit deficits in self-control expressed as a repeated failure of self-discipline and self-regulation and the structural characteristics of the game (speed of play, light and sounds) facilitate a lack of self-control (see Dowling et al. 2005; Griffiths 1993). The net result is that some players act on the spur of the moment (i.e., impulsively), which undermines their ability to plan and think carefully about how to gamble responsibly (Ledgerwood et al. 2009). During social casino play, micro-transactions allow the player to immediately resume play rather than waiting for credits to replenish after a specified period of time. The impulsive social casino gamer is unlikely to have the self-control to wait for this time to arrive. Instead, they are likely to make micro-transactions to continue play.

Lastly, we examined reward sensitivity as a possible predictor of micro-transaction purchases among social casino gamers. According to Gray's (1982) neuropsychological theory of personality, some people are more sensitive to signals of reward than others. Within the context of gambling, wins are highly rewarding. Perhaps not surprisingly then, problem gamblers are characterized by a heightened sensitivity to immediate reward (Maccallum et al. 2007; Sztainert et al. 2014), which manifests behaviorally as disinhibition (Cloninger 1988). Robinson and Berridge (2001), for example, argued that reward sensitivity is a primary reason people succumb to their urges. When it comes to social casino games, micro-transactions offer social casino gamers the opportunity for immediate reward. It provides social casino gamers the ability to extend play immediately (in of itself a reward) and provides an opportunity to obtain greater rewards (i.e., more credits, extra features). Thus, we hypothesized that people who engage in micro-transactions are likely to be more sensitive to rewards than their counterparts who do not engage in micro-transactions.

Why Would Social Casino Gamers Make Micro-transactions?

While understating *who* makes micro-transactions is of import, it is also beneficial to understand *why* social casino gamers choose to make micro-transactions in games that are free to play. Given that, to our understanding, there is no empirical research on social casino gamer's propensity to engage in micro-transactions, we based our assessment of possible motives on focus groups with social gamers (see Kim et al. 2016b) and available opportunities to make micro-transactions. Specifically, we assessed whether participants who made micro transactions did so to (1) access additional features in the game, (2) extend their play, (3) speed up play and/or (4) win back lost credits. Because this was not an extensive list of motives, we also provided an open-ended response option.

Due to the paucity of empirical research on social casino games, we were hesitant to make any strong predictions on whether any of the assessed possible predictors of micro-transaction engagement would also be associated with any particular motive for making micro-transactions. With that said, we did have a few a priori hypotheses. First, we predicted that people high in problem gambling severity would be apt to chase losses (akin to their propensity when gambling). In this way, social casino gamers who make micro-transactions and who are also problem gamblers are likely to be motivated to make micro-

transactions in order to win back lost credits. Second, people who are competitive may be motivated to make micro-transactions to accumulate additional credits and to access additional features (that may allow for the accumulation of additional credits). In doing so, they may be able to move up the game's leaderboard. Third, we hypothesized that people who are impulsive may be apt to make micro-transactions in order to continue play due to their inability to control (i.e., stop) their social gaming behavior. Similarly, impulsive people may make micro-transactions to speed up play in order to gain rewards quickly. Lastly, social casino gamers who are more sensitive to rewards may be motivated to purchase additional credits to both continue play as well as win back lost credits. This is because the immediate acquisition of additional virtual credits in order to continue play and the prospect of winning back lost credits may be especially rewarding.

Methods

Participants

Participants were recruited from Amazon's Mechanical Turk (MTurk)—a crowd-sourcing platform that has been shown to yield valid and reliable data among a wide array of populations, including clinical samples (Buhrmester et al. 2011; Paolacci et al. 2010; Rouse 2015; Shapiro et al. 2013). To recruit our target samples, we posted two separate recruitment notices, one recruiting participants who *engaged in* micro-transactions and another recruiting participants who had *never engaged* in micro-transactions. This was done to ensure equal number of participants per group as the aim of the research was to delineate the differences between those who engaged and those who do not engage in micro-transactions, rather than assessing the percentage of players who engage in micro-transactions. A total of 302 participants responded to the recruitment notice (152 who indicated they make micro-transactions in social casino games). The average age of the total sample was 35.02 years ($SD = 18.13$) with gender roughly being equal (150 males, 151 females, 1 unknown).

In regards to the specific demographic characteristics between the groups, social casino gamers who made a micro-transaction were on average 34.55 years old ($SD = 11.38$). The gender composition of this group was relatively equally split (71 males, 80 females, 1 unknown). Participants who engaged in micro-transactions had an average income corresponding to $40,000 to $59,000. 44.1 % of participants who engaged in micro-transactions reported being single while 55.9 % were married or in a common-law relationship. Social casino gamers who engaged in micro-transactions reported making an average of 6.65 micro-transactions per month with a standard deviation of 16.39. Conversely, the average age of participants who had never made a micro-transaction was 35.41 years old ($SD = 23.03$). The gender composition of this group was also relatively equally split (79 males, 71 females). The average income corresponded to $20,000 to $59.000 with 47.3 % of the sample reported being single and 52.7 % reported to be in a relationship.

Procedures

Participants who responded to the MTurk recruitment notices were re-directed to a survey hosted by Qualtrics. After providing consent, participants completed a series of questionnaires measuring the variables of interest. Upon completion of the questionnaires,

participants were debriefed regarding the purpose of the study and were provided $0.50 US as compensation—a normative rate for studies of similar length on MTurk (See Mason and Suri 2012).

An Ethics Certificate was obtained to conduct this study from the Research Ethics Board at the authors' home institution.

Measured Variables

Gambling Involvement

Participants were asked whether they currently gamble ("Do you currently gamble?") and the number of days and money spent gambling in the past 3 months. Further, gambling severity was assessed with the nine-item Problem Gambling Severity Index (PGSI; Ferris and Wynne 2001) ($\alpha = .92$). The PGSI contains items that assess problem gambling behaviors (e.g., "Have you bet more than you could really afford to lose?") and consequences of problem gambling ("Have people criticized your betting or told you that you have a gambling problem, whether or not you thought it is true?"). Responses are anchored at 0 (*never*) and 3 (*almost always*). Higher summed scores indicate greater gambling problems.

Competitiveness

An abridged version of the Competiveness Index (CI; Smither and Houston 1992) was used to measure level of competitiveness. The items were anchored at 1 (*strongly disagree*) and 7 (*strongly agree*) with higher scores indicating greater levels of competitiveness. Three items were chosen from each of the three subscales on the CI; emotion ($\alpha = .89$) (e.g., "I find competitive situations unpleasant", reverse coded), argument ($\alpha = .86$) (e.g., "I will do almost anything to avoid an argument", reverse coded) and games ($\alpha = .50$) (e.g., "I often try to outperform others").

Impulsivity

To measure impulsivity, we used an abridged (six-item) version of the BIS-Brief (Steinberg et al. 2013) ($\alpha = .82$). The BIS-Brief has been shown to demonstrate good construct validity with the original 30-item measure and thus provides an efficient measure of impulsivity without the loss of information (Steinberg et al. 2013). The items were anchored at 1 (*rarely/never*) and 4 (*almost always*) with higher scores representing greater levels of impulsivity.

Reward Sensitivity

Reward sensitivity was measured using two face valid items anchored at 1 (*strongly disagree*) and 7 (*strongly agree*), "I play social casino games in order to win large sums of virtual credits" and "I don't find social casino games to be rewarding [reverse coded]." Higher scores indicated greater sensitivity to rewards.

Motivation for Making Micro-transactions

Participants were asked to select reasons for engaging in micro-transactions and were informed to check all that applied. The options included, "to access more features", "to continue playing when I ran out of credits", "to speed up play", "to win back lost credits" and "other". Participants who selected the "other" option were asked to specify their motivations for engaging in micro-transactions (a text box was provided for participants to type their response).

Results

Preliminary Analysis

There were no significant differences between the groups on any of our demographic variables. Specifically, while participants who engaged in micro-transactions were slightly younger ($M = 34.55$, $SD = 11.38$) than participants who had never engaged in micro-transactions ($M = 35.41$, $SD = 23.03$), this difference was not statistically significant $t(299) = .42$, $p = .57$. Similarly, no statistically significant differences were found on sex $\chi^2(1) = .85$, $p = .37$, marital status $\chi^2(1) = .32$, $p = .57$ or level of income, $\chi^2(8) = 13.54$, $p = .10$ between the groups. As such, we collapsed across these demographic variables for all subsequent analyses.

Main Results

For the mean and standard deviation of each variable by group, see Table 1.

Gambling Involvement

Participants who engaged in micro-transactions (78.9 %) were more likely to be current gamblers than participants who did not engage in micro-transactions (55.3 %), $\chi^2(1) = 19.10$, $p < .001$, and reported a greater number of days gambling in the past three months ($M = 10.79$, $SD = 13.04$; $M = 5.35$, $SD = 8.48$) $t(196.65) = -3.57$, $p < .001$. Not surprisingly then, participants who engaged in micro-transactions also reported greater gambling severity $t(163.69) = -5.87$, $p < .001$. Specifically, participants who made a micro-transaction had a mean score of 3.53 ($SD = 4.77$) on the PGSI corresponding to a moderate-risk gambler, whereas the mean score of participants who had never engaged in micro-transactions was .72 ($SD = 1.82$), which corresponds to non-problem or low-risk gambler. Conversely, however, the groups did not differ on the average money spent on gambling $t(195) = .35$, $p = .74$.

Competitiveness

Social casino gamers who engaged in micro-transactions did not differ on any of the subscales of the Competiveness Index compared to social casino gamers who did not engage in micro-transactions, $ps > .60$. Indeed, participants who engaged in micro-transactions were not different on levels of emotion ($M = 5.20$, $SD = 1.36$), argument ($M = 3.60$, $SD = 1.40$) and games ($M = 4.50$, $SD = 1.05$) compared to social casino

Table 1 Means and standard deviations of the measured variables

Variable	Has made a micro-transaction *M*(*SD*)	Has never made a micro-transaction *M*(*SD*)
Number of days gambled in the past 3 months	10.79 (13.04)**	5.35 (8.48)
Money spent per day gambling over the past 3 months	57.70 (69.40)	61.74 (93.03)
PGSI	3.53 (4.77)**	.72 (1.85)
Competitiveness index		
Emotion	5.20 (1.36)	5.17 (1.28)
Argument	3.60 (1.40)	3.68 (1.47)
Games	4.50 (1.05)	4.49 (1.12)
Impulsivity	11.95 (3.41)**	10.36 (2.92)
Reward sensitivity	4.94 (1.19)**	3.96 (1.24)

PGSI problem gambling severity index

** $p < .001$

gamers who did not engage in micro-transactions, emotion ($M = 5.17$, $SD = 1.28$), argument ($M = 3.68$, $SD = 1.47$) and games ($M = 4.49$, $SD = 1.12$).

Impulsivity

Significant differences were found between the two groups on levels of impulsivity. Specifically, participants who engaged in micro-transactions reported significantly higher levels of impulsivity ($M = 11.95$, $SD = 3.41$) than participants who had never engaged in micro-transactions ($M = 10.36$, $SD = 2.92$), $t(294.33) = -4.36$, $p < .001$.

Reward Sensitivity

There was a significant difference between the groups on levels of reward sensitivity, $t(300) = -6.98$, $p < .001$. Participants who engaged in micro-transactions reported a heightened sensitivity for rewards ($M = 4.94$, $SD = 1.189$) compared to participants who had never engaged in micro-transactions ($M = 3.96$, $SD = 1.24$).

Motivation for Making Micro-transactions

The average number of motives endorsed for engaging in micro-transactions by social casino gamers was 1.79 ($SD = .87$). The most common reason cited for engaging in micro-transactions was to extend play when social casino gamers exhausted their initial seed credits (130). In contrast to purchasing virtual credits to extend play, 58 participants reported engaging in micro-transactions to access more features, 49 to win back lost credits and 27 to speed up play. Importantly, only eight participants selected the 'other' option, suggesting that the motivations assessed in this present research captured the most frequent reasons that social casino gamers engaged in micro-transactions. Of those who selected the 'other' response option, three participants noted they were motivated to make a micro-

transaction due to an advertised special offer, two reported they believed that making a micro-transaction increased their odds of winning, one made a micro-transaction to help level up (i.e., advance to the next level in the game), one wanted to start playing with a good size bank (i.e., to have a lot of credits at the onset of play), and one thought real money could be won by making a micro-transaction.

Micro-transactions: Does Who Predict Why?

Four separate binary logistic regressions were conducted with motivation to engage in micro-transactions (extend play, accessing more features, speed up play and win back lost credits) as the dependent variable and gambling severity, impulsivity, reward sensitivity (i.e., the individual difference variables that differentiated who made micro-transaction from those who did not make micro-transaction) as simultaneous predictors.[1]

The results showed that the only significant association between individual difference variables and motivation was that reward sensitivity predicted making micro-transactions to win back lost credits, Wald's χ^2 (1) = 11.04, $p = .001$, $B = .72$, $SE = .22$, $OR = 2.05$, 95 % CI (1.34, 3.13). No other individual differences predicted any the motivations to make micro-transactions, $ps > .06$ (see Table 2 for a complete summary).

Discussion

Social casino games have become ubiquitous on social networking sites. Moreover, users are bombarded with advertisements and opportunities to engage in social casino games. Despite being free to play, social casino games generate a handsome profit for its operators, with a significant portion of revenues coming from players' desire to purchase virtual credits. While recent reports suggest nearly half of social casino gamers make micro-transactions, little is known about the psychological characteristics of social casino gamers who engage in micro-transactions, let alone their motivations for doing. In this light, the present research provided the first empirical assessment of *who* and *why* social casino gamers make micro-transactions in games that are free to play.

The results found that social casino gamers who make micro-transactions report greater levels of gambling involvement, including greater number of days gambled and increased gambling severity compared to social casino gamers who have not engaged in micro-transactions. This finding is not surprising given micro-transactions' link to online gambling (i.e., facilitating the transition to online gambling; see Kim et al. 2015). Indeed, people who purchase virtual credits may transition to online gambling where the possibility exists of winning more than his or her initial wager. Conversely, however, it is possible that a reverse migration of sorts occurs, whereby gamblers turn to social casino games as a substitute for gambling (see Gainsbury et al. 2015). Providing support for this contention, there is preliminary empirical evidence to suggest that social casino games may act as a harm-reduction measure for disordered gamblers who wish to change their gambling behaviors (Hollingshead et al. in press). Thus, disordered gamblers who are in the midst of

[1] In addition to assessing whether the individual difference variables significantly predicted motivation for engaging in micro-transactions, we also conducted a multivariate regression with the number of motivations indicted as the dependent variable and problem gambling severity, impulsivity and reward sensitivity as the predictor variables. The results showed that reward sensitivity significantly predicted the number of motives indicted ($p = .008$). However, the number of motives indicated was not predicted by either impulsivity ($p = .15$) or problem gambling severity ($p = .16$).

Table 2 Binary logistic regressions of individual difference variables predicting motivations for making micro-transactions

Variable	Wald's χ^2	*p*	B	*SE*	*OR*	95 % CI	
						Lower	Upper
To extend play							
PGSI	.02	.90	.01	.06	1.01	.89	1.14
Impulsivity	2.79	.10	.16	.10	1.17	.97	1.42
Reward sensitivity	.61	.44	.18	.23	1.20	.76	1.90
Accessing more features							
PGSI	3.63	.06	.08	.04	1.08	1.00	1.18
Impulsivity	.12	.72	−.02	.06	.98	.87	1.10
Reward sensitivity	1.25	.26	.20	.18	1.22	.86	1.72
To speed up play							
PGSI	.45	.50	−.04	.06	.96	.84	1.09
Impulsivity	3.31	.07	.16	.09	1.17	.99	1.38
Reward sensitivity	.41	.52	−.15	.24	.86	.54	1.37
To win back lost credits							
PGSI	2.78	.10	.08	.05	1.08	.99	1.18
Impulsivity	.26	.61	.03	.06	1.03	.91	1.17
Reward sensitivity	11.04	.001*	.72	.22	2.05	1.34	3.13

PGSI problem gambling severity index

reducing their gambling may engage in micro-transactions to prolong play in an aim to decrease their craving.

Contrary to participants' statements in the focus groups conducted by Kim et al. (2016b), there were no differences in competitiveness amongst social casino gamers who engaged and those who did not engage in micro-transactions. A potential reason for the contrary results might be due to the fact that the participants in the focus groups were emerging adults (i.e., university students), whereas the mean age of the current sample was 35 years old. Thus, age differences may exist in psychological characteristics of social casino gamers who engage in micro-transactions—a possibility in need of empirical investigation. Further, social casino gamers who engaged in micro-transactions reported greater levels of impulsivity and reward sensitivity. These results make intuitive sense given that engaging in micro-transactions provided players the opportunity to immediately resume play and provide immediate rewards. Conversely, no significant differences were found on demographic characteristics between those who engaged in micro-transactions and those who did not.

In addition to delineating the demographic and psychological characteristics of social casino gamers who engaged in micro-transactions, we also assessed motivations (i.e., why) people purchased virtual credits. The results found that the most common reason for purchasing virtual credits was to continue playing once players run out of credits, rather than wait until the virtual credits are re-loaded. We also tested whether the individual differences predicted specific motivations for engaging in micro-transactions. Results showed that social casino gamers who reported greater levels of reward sensitivity engaged

in micro-transactions in order to win back lost credits. As such, the free credits provided to the social casino gamer by the social casino gaming operators may be a reward in their own right. Interestingly, problem gambling severity did not predict making micro-transactions to chase back lost credits. This lack of an effect may suggest that problem gamblers turn to gambling activities once they have exhausted their initial seed credits on social casino games. However, future research is needed to substantiate this proposition.

Contrary to our hypothesis, impulsivity neither predicted whether social casino gamers made micro-transactions to continue play nor to speed up play. It is possible that impulsive social casino gamers may engage in multiple social casino games (e.g., Slotomania, Big Fish Casino) in order to bypass the delay of waiting for the free credits to be loaded. If this is the case, then these social casino gamers would be able to bounce back from game to game in order to extend play, rather than engage in micro-transactions.

Implications

The present research may have important implications for policy around social casino games. As context, the convergence of social casino games and gambling has been flagged as a potential concern among researchers, clinicians and policy makers as it may normalize (and increase) future gambling behaviors (Derevensky and Gainsbury 2016). Unfortunately, the similarities between social casino games and online gambling have attracted the interest of gambling operators, who have begun purchasing and merging with social casino gaming operators (Sapsted 2013; Schneider 2012). The gambling operators' explicit aim in entering the social casino gaming market is to use these free gambling-like games to attract potential new customers and one potential strategy to attract new customers is to encourage the use of micro-transactions (see Kim et al. 2015).

The current results suggest that people who are apt to make micro-transactions report higher problem gambling severity and furthermore, show an increase in impulsivity and reward sensitivity. This is a concern as both impulsivity and reward sensitivity have been a risk factor for developing gambling problems (Maccallum et al. 2007; see Sztainert et al. 2014), and purchasing micro-transactions may facilitate the migration to gambling activities where the potential harms are significantly greater (Kim et al. 2015). Unfortunately, the potential harms associated with making micro-transactions might be greatest for those who are already at risk for developing gambling problems (i.e., social casino gamers who are higher in impulsivity and reward sensitivity). If potential problems are to be mitigated, policy makers should encourage social casino gaming operators to educate their customers about the potential consequences of making micro-transactions, especially amongst players who may be vulnerable to migrating to gambling or developing a gambling addiction.

Limitations

Several limitations from the present research should be noted. First, the present research cannot speak to the causality between micro-transactions and increased gambling pathology. Indeed, it is possible that problem gamblers and gamers are more likely to engage in micro-transactions, rather than micro-transactions being a risk factor for increased gambling pathology. Research examining the temporal relationship between the association of micro-transactions and gambling pathology would be highly informative.

Second, we note that there are likely other important variables that may differentiate social casino gamers who engage in micro-transactions from those who do not. Indeed, given the nature of online data collection (i.e., short surveys), we were limited in the amount of variables that could be included in the research (Schulze et al. 2011). Thus, we call on researchers to assess whether other variables (e.g., social support) are associated with engaging in micro-transactions.

Conclusion

Social casino games generate a handsome profit for its operators, in part, through gamers desire to make micro-transactions. Unfortunately, engaging in micro-transactions may result in significant financial consequences (Wells 2015) and/or facilitate the transition to online gambling (Kim et al. 2015). Whilst the results of the present research shed light into *who* and *why* social casino gamers spend money to engage in games that are otherwise free to play, more research is needed in this domain. Indeed, a greater understanding of the antecedents and consequences of making micro-transactions will provide valuable insight and inform educational initiatives to minimize the potential harms of social casino games generally and micro-transactions more specifically.

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Compliance with Ethical Standards

Conflict of interest Kim has received research grants from the National Center for Responsible Gaming (NCRG), Alberta Gambling Research Institute (AGRI), and Gambling Research Exchange Ontario (GREO). Kim also holds a doctoral scholarship from AGRI. Wohl has received research grants from NCRG, GREO, Manitoba Gambling Research Program and the Ministry of Long Term Health and Care. Wohl has presented at the New Horizons Conference (British Columbia Lottery Corporation) and the Responsible and Problem Gambling Stakeholders Symposium (Alberta Gaming and Liquor Commission) with travel expenses covered. Hollingshead declares no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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