

**RESEARCH
REPORT**

Mobile EGMs Apps – The perfect substitute or the perfect storm?

August 2018



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To cite this report

Rockloff, M, Greer, N, Armstrong, T, Thorne, H, Langham, E, Browne, M, Moskovsky, N, Goodwin, B, Li, E, 2018, *Mobile EGMs Apps – The perfect substitute or the perfect storm?*, Victorian Responsible Gambling Foundation, Melbourne

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Our vision: A Victoria free from gambling-related harm



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MOBILE EGMS APPS

The perfect substitute or the perfect storm?

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Acknowledgements

This project was funded through a grant received from the Victorian Responsible Gambling Foundation.

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Executive Summary

This report details a program of research devised to address the Victorian Responsible Gambling Foundation (VRGF) questions about free-to-play mobile apps that mimic traditional gambling games. Although these products do not involve winning real money, they can involve winning free play-time and thus replicate a critical element of real EGMs, where time-on-machine is one of the main motivations for seeking wins.

In the specifications for the grant program, the VRGF posed the following questions¹ :

Grant-Program Research Questions

“What impact does the changing gambling environment and normalization have on young people?”

and

“What impact have new technologies, such as gambling apps, had on consumers, particularly children and adolescents?”

The Experimental Gambling Research Laboratory at CQUniversity proposed research, reported herein, that specifically examines the role of free-to-play gambling-themed apps and their relationship to in-venue gambling. To address the question of how these games affect young people, the study was restricted to participants aged 18-29 and used both a retrospective survey of childhood gambling, as well as a 6 months (24 weeks) longitudinal experiment that mimicked features of a Randomised Control Trial (RCT)².

The retrospective survey was an internet-based “scoping survey” of people who had gambled on an EGM at least once in the last 6 months. Australian participants were sourced from an online panel provider (SSI International, n = 500) and a major online sports-betting bookmaker (n = 242). People with frequent EGM gambling experience were preferentially recruited. According the Problem Gambling Severity Index (PGSI), the sample included a relatively balanced number of non-problem, low-risk, moderate-risk and problem gamblers (24.3%, 27.2%, 26.4% and 22.1%, respectively). Slightly over half of the participants were male (57%).

To address the broad questions about normalisation of gambling (above), the research program was devised to address more specific questions that were outlined in the grant-application, as reproduced below.

¹ See page 6 of Grant Specifications Document, Tender 2015-1

² This experiment was not a medical treatment, but otherwise conforms to the randomised assignment of participants to condition that defines an RCT.

- Research Q1: Does simulated-gambling app use in adolescence and young adulthood generally precede real gambling, or conversely, are existing gamblers more often drawn to use such apps?

The scoping survey asked respondents about their real-money gambling and simulated-gambling app use in childhood and adolescence. Our findings showed that people who played gambling-themed apps prior to their 13th birthday also more frequently gambled for real money prior to age 13. Moreover, we found that people who had played gambling-themed apps prior to the age of 13 gambled more frequently for real-money on EGMs during adolescence. This effect held true even when controlling for gambling frequency prior to the age of 13. This latter finding provides some evidence for the causal model of apps encouraging real-money gambling in adolescence, although it does not reach the standard of experimental evidence.

- Research Q2: Is use of our EGM app a positive predictor of real gambling or, alternatively, a substitute product that negatively predicts subsequent gambling?

To research Q2, we conducted a 24 week longitudinal experiment that mimicked a Randomised Control Trial (RCT). Gamblers were invited into the trial upon completion of the scoping survey described above. Five-hundred and fifty-six (N = 556) participants completed at least 1 week of the trial with an average of 12.4 weeks of complete data per participant. At random, approximately half of the participants (48.2%) were assigned to the test condition and the rest to the control condition. Test participants were asked to play our dedicated EGM-themed app, Lucky Lolly Slots, for at least 5 minutes each week, and fill-out a short weekly survey about their gambling over the prior week. Control participants were only directed to fill out the weekly survey.

In the weeks where people played more on gambling-themed apps, including the Lucky Lolly Slots app and any other gambling-themed apps that they independently chose to play, they also spent more time participating in real-money gambling. Even more credible, however, was the evidence of app-play from prior weeks predicting the current week's real-money gambling. Controlling for the prior week's real-money gambling (t-1), people gambled for longer in the current week (t) if they had also played more on gambling-themed apps in the prior week (t-1). Conversely, real-money gambling in the prior week was also related to app-play in the current week, although the relationship was not as strong. Taken together, these findings provide further evidence of app-play contributing to increases in real-money gambling in young adults.

- Research Q3: Is there a difference between the effects of simulated-gambling app use on intensive/regular gamblers compared to casual/occasional gamblers?

The 24 week longitudinal experiment also addressed Q3. We speculated that gambling-themed apps may have a protective function for regular players who were trying to reduce expenditure on gambling, since they may use the apps as a benign substitute for real-money

gambling. Specifically, we looked for evidence that people who were, by their own admission, actively trying to reduce expenditure on their gambling were using gambling-themed apps successfully to this end. Although we found some evidence that the correlations between app-play and real-money gambling were weaker for these participants, they were not significantly weaker. In short, there was no clear evidence for the existence of a subset of players who are successfully using such gambling-themed apps to reduce their gambling.

- Research Q4: What are the general patterns of usage for our mobile pokie app? Who uses such apps, and what are the times and places where they are used?

The longitudinal experiment found that people with higher PGSI scores played pokie-apps more frequently. Overall, people played EGM themed apps for 2.5 hours on average, regardless of PGSI status, and 4.78 hours when considering only non-zero play weeks. Use of our assigned Lucky Lolly Slots app was lower. People played a median of 2 sessions each week, although they were only required to play one session. Participants gambled a median of 68 spins each week on Lucky Lolly Slots, and for a median of 4 minutes.

- Research Q5: What are players' understanding and reasoning regarding how app usage affects real gambling? What broad themes can be identified?

To better understand the details surrounding the interactions between app-play and real-money gambling, we also conducted interviews with a subset of participants from the 24 week trial. For this phase of the study we collected the first names and contact phone numbers of 50 willing participants and ranked them in order of those who had showed the greatest changes, both in terms of increases and decreases in gambling, over the time of the trial. We then prioritised contacting participants ranked higher in this list; ultimately conducting telephone interviews with 20 people. These interviews took place after the 24 week trial, and followed a semi-structured approach. Major themes discovered included a strong recognition of family influence on playing such gambling-themed apps. Gamblers who played the apps also often recognised that they encouraged them to “try (their) luck” at “the real thing,” i.e., real-money gambling. People noted their feelings of regret (or disappointment) when winning on an app, wishing that the win had come with real-money rewards on a commercial game. While there was some recognition-particularly amongst low-risk gamblers-that performance on such apps might not be replicated in a commercial environment, many were still motivated to gamble as a result of playing the apps. In addition, people often reported seeing gambling-themed apps as an opportunity to learn more about gambling games and experiment with different, and riskier, styles of play. People perceived the apps to be a risk-free environment, despite the potential we discovered for players to gamble more on high-risk real-money gambling where there is the potential for gambling-related harm.

Harm from the longitudinal experiment?

As outlined in our Ethics application for this project, there was the potential risk of introducing people to apps that might exacerbate their gambling involvement and gambling-related problems. While gambling-themed app use was associated with relatively greater real-money gambling, the great majority of participants decreased their frequency of gambling over the course of the study. Moreover, the significant predictive relationship between simulated-gambling app use and real-money gambling occurred for apps that were chosen independently by participants and not the Lucky Lolly Slots app that they were assigned to play.

Policy Implications

Gambling-themed apps are generally available to youth and thus create a natural concern that using such apps can be a means by which young people are groomed to be adult gamblers. There are two major policy implications for this research; where the first involves children and adolescents, and the second involves adults.

First, gambling-themed games do not appear to be risk-free. Despite low financial involvement, there is a consistent association between gambling-themed app play and real-money gambling. As shown herein, children who play such apps prior to age 13 gamble more frequently in adolescence. Gambling involvement in adolescence, in turn, also appears to be highly related to adult gambling problems (Winters et al., 2002). These findings show that there is a good case for discouraging or restricting the availability of such gambling simulators from the reach of children. There may also be a reasonable case for discouragement or restriction of the use of gambling-themed apps in adolescence, considering the confluence of app-use, and gambling frequency and problems in young adults.

Second, there is good experimental evidence from young adults that the use of gambling-themed apps is related to real-money gambling across time. Many participants expressed a subjective awareness that such apps encouraged them to “try (their) luck” at gambling while, conversely, there was little evidence for the notion that such apps are a benign substitute activity.

The gambling-public should be made aware that such apps can encourage people to gamble “for real” and thereby expose them to the potential for gambling-related harm. Importantly, anecdotal accounts report that gambling counsellors and therapists are suggesting such gambling-themed apps as a potential substitute activity during treatment for gambling problems (Thorne, Goodwin, Langham, Rockloff, & Rose, 2017). Evidence from this current study suggests that such an approach is not warranted and may even prove dangerously counterproductive.

Chapter 1 Literature Review

Trends in media use have led to a change in the way many forms of gambling are delivered and experienced; providing new and potentially more accessible and engaging gambling environments (Dussault et al., 2017; Gainsbury, Russell, et al., 2014a). Portable media devices, such as tablets and smartphones, and the widespread availability of wireless internet networks, means that online, internet or remote gambling is becoming both more popular and more difficult to regulate (Gainsbury, Hing, Delfabbro, & King, 2014; Gainsbury, Wood, Russell, Hing, & Blaszczynski, 2012; Griffiths, 2003). The new internet media is multifaceted and interconnected; providing the ability to make calls from the television, play games on your mobile phone, and watch television from your computer (de Freitas & Griffiths, 2008). These technologies are resulting in profound changes in the way people consume all forms of media and electronic entertainment, including gambling and emerging gambling products.

Reflecting the increasing popularity of portable media devices and social media applications, there has been a substantial rise in the number of gambling products (including monetary and simulated forms) available to consumers via varying platforms; increasing gambling accessibility and exposure to consumers (Gainsbury, Hing, et al., 2014). Because mobile devices are inherently easy to access, consumers can select a broad range of digitalised games: anytime and anywhere (Derevensky & Gainsbury, 2016). These games can often be downloaded for free and accessed without limitation through wireless internet feeds. The increasing popularity of games and mobile applications means that manufacturers of gambling products have a new environment in which to market gambling content to young consumers.

As well as an increase in the use and availability of online real-money gambling products, media and technology can now offer simulated *gambling games* that replicate or mimic gambling activities, but do not involve monetary risk or monetary rewards (Gainsbury, Hing, et al., 2014). While simulated games may involve the purchase of credits, gambling rewards are not convertible to cash. Because simulated gambling games appear so similar to monetary gambling, they tend to blur the boundary between gambling and gaming (Derevensky & Gainsbury, 2016; Griffiths, 2003). Similarly, the fast-evolving digital environment makes it challenging for researchers to identify, define and study the use of these products. Given that informal internet-based currencies or tokens may be used; with real or perceived value, this raises questions of whether simulated games might be considered “gambling” according to a traditional definition (King, Delfabbro, & Griffiths, 2010). Many games might have free-play time or special unlocked features as a reward, and these rewards have a tangible value to players that they might otherwise be willing to purchase. Moreover, very little is known about the impact of engaging with simulated gambling games on real-gambling behaviours and attitudes. The intense use of digital entertainment by children and youth entails that they have correspondingly higher exposure to gambling games, which may act to increase their vulnerability to problems associated with both monetary and simulated gambling. The current chapter will review and discuss the literature surrounding simulated gambling products with a specific focus on potential impacts to adolescents and youth.

An Introduction to Online Gambling Games

Mobile application stores and social media platforms commonly offer games that involve a simulation of a real-world experience. Simulated gambling games are readily available in mobile app stores and also embedded within other mobile games as “mini-games.” Simulated gambling games refer to products that include similar play-features and can resemble the seductive nature of real-gambling, but do not require any monetary investment (Griffiths, 2003). This makes it increasingly difficult for consumers to distinguish between what is considered gambling, simulated gambling or simply just gaming (Abarbanel, Gainsbury, King, Hing, & Delfabbro, 2017; King, Russell, Gainsbury, Delfabbro, & Hing, 2016; Albarran Torres & Goggin, 2014; Abarbanel et al., 2017; King et al., 2016). Applications within an application, social networking sites, installable applications, gambling mini-games or practice sites are just some of the many products incorporating gambling themes available to consumers (Floros, Siomos, Fisoun, & Geroukalis, 2013).

Gainsbury, Hing et al. (2014) developed a taxonomy for understanding the different online gambling products available and proposed that games could be categorised based on their structural characteristics: the monetary requirements; the platform via which it is delivered; and the centrality of a gambling theme to game play. For a game to be considered gambling it must involve monetary investment towards a game-related outcome and provide a dividend or reward (either fixed or partially predetermined) based on an element of chance (Gainsbury, Hing, et al., 2014). If a monetary investment is an optional feature of the game and game play can continue without making a payment, or the outcome is not at least partially determined by chance with a pre-determined reward, the game is not considered gambling (Gainsbury, Hing, et al., 2014; Parke, Wardle, Rigbye, & Parke, 2012). Simulated gambling games can be organised into four forms: 1) social casino games; 2) social games or virtual worlds with casino features; 3) practice games; and 4) standalone console, online, or mobile games (Gainsbury, Hing, et al., 2014).

The first two forms of simulated gambling games are integrated or reliant on social media platforms such as Facebook or Twitter (Gainsbury, Hing, et al., 2014). These sites offer a number of games that can be played either collaboratively or in isolation, and can incorporate gambling type features. Games integrated into social media are differentiated as either social casino games or virtual world with casino features based on the extent that the gambling theme is central to game play (Gainsbury, Hing, et al., 2014). For example, social casino games come in many forms (i.e., slots, bingo, blackjack, roulette etc.), can be downloaded through social media sites, and use virtual currency (King et al., 2010). These games allow for people to play socially, and against real people using their social media profiles. Conversely, social game or virtual world with casino feature games are those where gambling is not the primary focus of the game, but the game includes gambling themes or features such as virtual currency to wager on things like spinning wheels, symbols, or virtual contests (Gainsbury, Hing, et al., 2014). These features tend to be included to allow for players to receive greater rewards more quickly or accelerate their progress in the main game (King et al., 2010). Social casino games are often not connected closely in ownership or form to in-venue gambling. While

these games have the outward appearance of their in-venue cousins, they should not be confused with practice games.

Practice games and stand-alone console, online or mobile games refer to gambling style games that are not integrated with social media platforms, and are distinguished based on the provider of the game (Gainsbury, Hing, et al., 2014). Practice or demo games refer to those provided by gambling operators who also manufacture real gambling products; whereas those that are supplied by providers independent from gambling industry are referred to as stand-alone, online or mobile games (Gainsbury, Hing, et al., 2014). These games are generally simulations of traditional games (i.e., blackjack, slots, poker etc.), can be downloaded to a media device, and involve virtual currency (King et al., 2010). Practice or demo games are generally offered by online casinos so users can try the product before investing real money (Gainsbury, Hing, et al., 2014; King et al., 2010), whereas standalone games are not associated with real gambling sites and products (Gainsbury, Hing, et al., 2014).

Simulated gambling games, including types that mimic real-world casino mechanics, may or may not have credit payouts that mimic their real world counterparts. The detection of long-run payout rates in such games is difficult without access to a payout table, and consequently little is known about payout rates for the various forms of simulated games. Speculatively, social casino games where players can purchase credits might have lower payouts to prompt expenditures, whereas demo games may provide inflated payouts to encourage people to transition to the real gambling game.

Simulated Gambling and the Association with Monetary Gambling: What is known?

Many simulated gambling games are advertised or promoted as fun, youth friendly forms of entertainment (Griffiths & Parke, 2010); causing concern amongst numerous gambling researchers as to how the use of - and exposure to - simulated gambling games may impact on the gambling behaviours of youth and adolescents (Derevensky & Gupta, 2007; Griffiths, 2003; Ipsos MORI, 2009; King et al., 2010; King, Delfabbro, Kaptsis, & Zwaans, 2014a; Messerlian, Byrne, & Derevensky, 2004; Williams & Wood, 2007). Before we can consider the impact of these products on gambling, it is important to explore how these products are being used in conjunction with real gambling products. For the remainder of this chapter, simulated gambling hereafter is defined according to King et al. (2014a, p. 305) as:

“...a digitally simulated interactive gambling activity that does not directly involve monetary gain but is structurally identical to the standard format of a gambling activity due to its wagering features and chance-determined outcomes of play.”

Very few studies have investigated the prevalence of simulated gambling game-play in the adult population. One study conducted by McBride and Derevensky (2009) sampled 563 participants between the ages of 18 and 65 years on their internet gambling behaviours. Participants were recruited via online advertisements posted on casinocity.com; providing an

internationally diverse sample of online gamblers and gamers. While less than half of those sampled in the study gambled online (42.3%), over 77% reported playing online non-monetary gambling type games; suggesting that adults who gamble on simulated games are not necessarily internet gamblers. The majority of those who played simulated gambling games tended to play on multiple sites (two to five; 58%), with the remaining 41.4% reporting play on only the one site. Most of those who used these products played for less than 1 hour each session (43.5%), however, 33.3% reported playing between 1 – 2 hours per session, while nearly a quarter (22.8%) played over 4 hours per session. In their study of adult social casino gamblers, (Gainsbury, Russell, King, Delfabbro, & Hing, 2016) showed that those who subjectively equated monetary gambling to simulated gambling had a greater frequency of simulated gambling game play. Greater frequency of simulated gambling may therefore pose a risk factor for developing monetary gambling habits. Those who do not transition to monetary forms of gambling, while not experiencing the financial burdens of gambling, may similarly experience problems with dependence, lost time, dissociation and other non-financial harms.

Research suggests that a substantial portion of adolescents and youth play simulated gambling games (Derevensky & Gupta, 2007; Griffiths & Wood, 2007; Hardoon, Derevensky, & Gupta, 2002; Ipsos MORI, 2009; King et al., 2014a; McBride & Derevensky, 2009). For instance, King et al. (2014a) explored digitalised gambling activities amongst a sample of 1287 high school students (ages 12 to 17 years) and found that 31% had engaged with non-monetary gambling at least once, and a further 13% reported to using simulated gambling products within the 12 months prior to the study. Twenty-five percent of participants reported to having played a gambling themed game within a video-game; while far less reported to having played standalone gambling simulation apps (6.3%) and demo or practice modes (4.7%). Similar prevalence rates have been found in a large-scale British population survey exploring the gambling behaviours of 8958 youth between the ages of 12-15 years (Ipsos MORI, 2009). Over a quarter of participants (28%) reported to having played simulated gambling games in the seven days prior to the study. Prevalence rates of simulated gambling usage among youth suggest that a significant minority of children are attracted to gambling games (Ipsos MORI, 2009).

Despite relatively high exposure to simulated games, youth prefer to gamble with real money than on games that offer points or simulated credits (Forrest, King, & Delfabbro, 2015). Unlike adult populations, it appears as though simulated and monetary gambling co-occur in adolescent populations. That is, those who do gamble online for real money are more likely to also play simulated gambling games. Results from the British prevalence survey mentioned earlier showed that youth participation in free-play gambling products in the seven days prior to the study was the single most prominent predictor of whether they had gambled with real money in the same seven day period (Ipsos MORI, 2009). Griffiths and Wood (2007) found that 29% of adolescents who gambled online would also report playing free demo games, while (King et al., 2014a) showed that the number of simulated gambling activities respondents reported playing in the past 12 months was the strongest predictor of monetary gambling. More recent research by King and Delfabbro (2016a) showed that youth who

engaged in financial forms of gambling also engaged in simulated gambling, but those who engaged in simulated games did not necessarily gamble for money. Males were also more likely than females to report both simulated gambling and financial gambling. These findings have been supported by Gainsbury et al. (2016) who found that gambling as a result of simulated game play was more likely among younger males. These findings suggest that simulated gambling may be more concerning amongst those vulnerable to gambling problems given that the younger, male demographic appears to engage in both simulated and monetary gambling (Gainsbury, King, Russell, Delfabbro, & Hing, 2017; Gainsbury et al., 2016; King & Delfabbro, 2016a). It is important to note, however, that most of these studies involve self-report of behaviours, and adolescents can be particularly prone to miss-reports due to inattention and/or mischievousness.

While not everyone who plays simulated gambling games also gambles for money, these simulated gambling games have the potential to serve as a gateway to monetary gambling (Hardoon et al., 2002). A number of cross sectional studies have reported simulated gambling to be a predecessor to monetary gambling (Gainsbury et al., 2016; Griffiths & Barnes, 2008; King et al., 2016). For instance, in a study by Griffiths and Barnes (2008), 21% of internet gamblers (N=473) reported demo or practice games to be the primary reason for gambling online. Similarly, (King et al., 2016) found that two thirds of adolescent social casino game players (N=130) claimed that social casino games preceded monetary gambling. In a study by Gainsbury et al. (2016), of the 521 adult gamblers who had engaged in social casino games in the 12 months prior to completing a survey, 71.2% reported that playing social casino games did not impact on their real gambling behaviours. However, 9.6% reported an increase in gambling in the past 12 months, while 19.4% suggested that simulated gambling had directly contributed to gambling for money.

While it is likely that involvement with simulated gambling products may contribute to the development of monetary gambling and gambling problems, an alternate explanation is that higher participation by those experiencing problems may reflect an effort to reduce monetary gambling activities by replacing them with non-monetary forms. Engaging in simulated gambling activities does not necessarily mean that consumers will transition to real gambling (McBride & Derevensky, 2009). It is likely that there may be other factors beyond the simulated gambling activity itself that promote monetary gambling engagement. For instance, Hollingshead et al. (2016) suggest that those who play simulated games to reduce gambling cravings report an overall decrease in monetary gambling whilst those playing for excitement or to cope with negative life events report no change to real gambling involvement. However, those playing simulated games for social interactions and to build gambling skills are more likely to experience an increase in monetary gambling involvement. The impact of simulated gambling on monetary gambling is therefore determined by the motivation behind simulated game play.

Few studies have explored the longitudinal relationship between simulated gambling and the initiation of monetary gambling (Dussault et al., 2017; Kim, Wohl, Salmon, Gupta, & Derevensky, 2015). Kim et al. (2015) explored the transition from social casino gaming to

online gambling in a sample of 409 social casino gamblers (ages 18 to 69 years) who had never gambled online for money prior to the study. At a six month follow up, approximately 26% of social casino gamers had transitioned to monetary online gambling. Dussault et al. (2017) used a similar methodology to explore the transition from simulated to monetary gambling in a sample of 1220 adolescents (ages 14-18 years old) over a one year period. Participants were included on the basis they had never gambled for money prior to the time of recruitment. Results suggested that playing a simulated gambling game was associated with the initiation of monetary gambling. Of those who participated in a simulated version of a gambling game, 28.8% had gambled with real money during the one year period. However, this relationship existed only for those who transitioned from simulated poker to playing poker for real money. Authors suggested that free-play poker sites may be used in order to refine skills and learn game strategies prior to playing for money, and may therefore appeal to those with a pre-existing interest in monetary gambling.

Simulated gambling games are likely to increase risk-taking behaviour when playing with real money. Bednarz, Defabbro and King (2013) sampled 80 participants and explored the extent to which prior experience on a free-play mode affected real gambling on a computer based roulette game. Participants were divided into one of four exposure conditions that determined whether or not they played the simulated gambling product and the outcome of the session. Conditions included a no exposure condition (control group), a loss condition, a break-even and a profit condition (return to player was greater than 100%). They expected that those who played the free-play game would show greater risk-taking when playing for real money compared to the no free-play control group. Their results showed that pre-exposure to free-play products had a significant effect on the total number of credits wagered, and the average number of credits wagered per spin when playing for real money. Those who did not play the free-play game placed smaller bets than any of the free-play conditions, and overall had significantly lower average expenditures than both the break-even and winning free-play groups. This suggests that those who use simulated gambling products may be more likely to spend more when gambling with real-money.

While there are yet to be any longitudinal studies exploring the developmental associations between simulated gambling and gambling problems, cross sectional research suggests an association between simulated gambling and gambling problems (Gainsbury et al., 2016; Hardoon et al., 2002; King & Delfabbro, 2016a; King et al., 2014a). For instance, in an adult sample of social casino gamers, (Gainsbury et al., 2016) found that those who reported gambling for money as a direct result of simulated game play were more likely to have higher levels of problem gambling severity. Hardoon et al. (2002) investigated the association between gambling behaviours and simulated game play of 2336 youth between the ages of 12 and 19 years. Results showed that gambling online without money was very popular amongst youth, particularly for probable pathological gamblers (25%) and at-risk gamblers (20.4%). Similarly, a study by King et al. (2014a) showed that students who endorsed items on a measure of pathological gambling were three or more times more likely to use simulated gambling products. Those categorised as at-risk pathological gamblers had significantly higher prevalence rates for simulated gambling than non-pathological gamblers. Further, despite

low numbers of participation for gambling via standalone products (or mobile apps; 6.3%), this form of gambling was over 6 times more prevalent among at risk gamblers compared to non-problem gamblers. This suggests that while the majority of those who use simulated products do so inadvertently through other video games, those experiencing problems are more likely to engage in standalone gambling products that simulate real gambling.

The association between simulated gambling participation and problems was further supported in the British population study of youth (Ipsos MORI, 2009). Among those who had gambled, participation in free-play modes was the strongest predictor of problem gambling. This study identified similarities between the use of simulated products and participation in other gambling forms as identified with internet gamblers. There was a clear relationship found between simulated gambling and gambling for money. However, the proportion of expenditure on online gambling was found to be relatively low (1%) compared to other forms, suggesting that those who were attracted to these products tended to gamble offline. That is, youth who gambled on free-play or simulated gambling products were more likely to engage in traditional or land-based gambling activities rather than internet gambling products.

More recently, King and Delfabbro (2016a) compared problem gambling symptoms of youth who played gambling simulations and those that played gambling simulations as well as gambled for money. Results showed that both groups reported to experiencing a preoccupation with gambling, while those who gambled for money as well as on simulated gambling games also experienced gambling-related conflicts with family, friends or school. These findings suggest that an interest in gambling, or simulated gambling in isolation, may not necessarily cause harm unless people are also engaging in monetary forms of gambling.

Simulated Gambling: Issues and Implications

Given the increasing prevalence and broad nature of simulated gambling products, and their associations with monetary gambling, it is important to determine how and under what circumstances simulated gambling involvement may result in a transition to monetary gambling. Examination of this transition is particularly important when considering young consumers who are more likely to be at risk with the emergence of new, online gambling products (Gainsbury, Hing, et al., 2014; Griffiths, 1999; Griffiths & Parke, 2010; King et al., 2010, 2014a). Many authors have provided insights into why adolescents or youth may be more vulnerable to gambling through technological means (de Freitas & Griffiths, 2008; Derevensky & Gupta, 2007; Griffiths, 2003, 2005; Griffiths & Parke, 2010; King et al., 2010). They suggest that simulated gambling involvement increases exposure to gambling, and allows for practice and experimentation; but also promotes misperceptions about skill and the probability of winning.

Practice and Experimentation with Gambling

Simulated gambling games offer consumers the opportunity to gamble without the risk of losing money. Demo or practice games featured on product websites allow people to

familiarise themselves with how a game operates and explore in-game features without the negative financial consequences associated with losing (Derevensky & Gainsbury, 2016; Frahn, Delfabbro, & King, 2015; Griffiths, 2003). This means that novice bettors, that may be nervous or unwilling to invest money to experiment with gambling products, have the ability to “try before they buy” (Gainsbury et al., 2012), allowing those who would otherwise avoid gambling for fear of losing money to explore how a game operates and practice before gambling on the real thing.

Increased familiarity with a game through experimentation and practice is likely to promote overconfidence in one's ability to play and generate the illusion that gambling “is just a game” when engaging with monetary forms (Bednarz et al., 2013; Griffiths, 2003; King et al., 2010). In studying the relationship between simulated and monetary gambling, (Bednarz et al., 2013) showed that practice modes promoted false perceptions around skill, and generated increased confidence in one's gambling ability. Over half of participants who used free-play modes (68.3%) reported feeling more confident when playing roulette for real-money, and a further 48.3% believed that the practice modes enhanced their ability to play the game. Simulated games are therefore likely to contribute to greater risk taking when gambling with real money due to an overconfidence generated from the perception that practice can impact on gambling outcomes and the ability to play the game.

This opportunity to practice and experiment is particularly relevant for younger people, for whom it is otherwise illegal to engage in gambling. For adolescents, real gambling may have appeal as ‘adult’ activities. This may add to the attraction of simulated games, since they provide a means to participate in an otherwise forbidden activity. Currently, there are no age restrictions on access to free-play or simulated gambling games. Not only can underage gamblers access these practice sites, they are also exposed to simulated gambling through other online channels such as social networking sites, mobile phone applications or within video games that have relatively lax age verification measures (Abarbanel et al., 2017). In their survey of online gambling sites, (Smeaton & Griffiths, 2004) found that majority of sites did have practice or demo sites available to adolescents, and that minimal restrictions were in place to prevent underage gamblers from switching to the monetary version of the game. Simulated games might therefore serve to groom youth into developing gambling habits that are then transferred across to real gambling following this initial experimentation.

Despite gambling being illegal in many jurisdictions for those under 18 years of age, and some efforts made to restrict underage access to internet gambling products, many youth can and do engage in both monetary and simulated gambling online (Griffiths, 2003; King et al., 2014a). Few gambling sites appear to be effective in restricting access or implementing effective age verification (Poulin, 2000; Smeaton & Griffiths, 2004; Griffiths, 2003; King et al., 2010; Poulin, 2000; Smeaton & Griffiths, 2004) and fail to protect some of the most vulnerable consumers (underage gamblers) from illegally accessing online gambling services. The ability to access simulated gambling games does not necessarily mean that people will transition to monetary forms of gambling. It is likely, however, that lax or absent regulation of simulated games

designed to promote monetary gambling, and inadequate age verification measures may encourage monetary gambling among youth and adolescents.

Increased Exposure to Gambling Themes & Advertising

Mobile games and the increased popularity of online media mean that people are likely to be exposed to gambling themes and content despite not necessarily looking for it. This can occur three ways: through inadvertent gambling exposure, social facilitation of gambling exposure, and advertising.

Inadvertent gambling exposure

Inadvertent gambling exposure occurs when consumers are exposed to gambling related themes within other social games. In such cases, those who may not necessarily be interested in gambling are exposed to, and can be pressured to engage with, gambling related activities as part of their regular game play experiences (Floros et al., 2013). These features are often included as a way to receive rewards or unlock features to allow the player to progress to higher levels in the game (Floros et al., 2013). Therefore, the ability to continue game play or reach a goal is often dependent on engaging with the gambling feature.

Social facilitation of gambling exposure

Social facilitation of gambling exposure is most relevant for social casino games where consumers play the gambling themed game (such as slots, blackjack or roulette) via their social media account. These types of games encourage players to share the gaming experience with their social network, as well as invite others to play in order to receive in-game incentives and rewards (Abarbanel et al., 2017). Sharing in-game experiences means that the game is then broadcast to everyone in the player's social network, often seeking social recognition for in-game successes and tempting others to do the same in order to receive similar recognition from their peers (King et al., 2010). Many of these games include an active recruitment tool that encourages players to invite a friend in order to receive in-game rewards (Abarbanel et al., 2017). Most commonly, these games encourage people to promote the game through a targeted advertisement to others in their social network. These features are similar to those found on real poker sites, where programs encourage people to invite friends in order to receive free credits or similar incentives (McMullan & Kervin, 2012). Not only do these features expose a potential by-stander to gambling related content, but pressure to conform may promote active engagement by someone who may not have otherwise been exposed or interested in gambling, either simulated or real (King et al., 2010; Ladd & Petry, 2002).

Advertising

Many social casino game companies that promote simulated games via social media are now owned by gambling operators, but are not subject to the same regulations as gambling

advertisements (Abarbanel et al., 2017; Derevensky & Gainsbury, 2016). Advertisements can interrupt game play or app usage (regardless of whether it is a gambling-themed game), offer links or videos to the social casino game, take over the entire screen with specified-minimum viewing times and offer incentives for new players (Abarbanel et al., 2017). Similarly, demo or practice games offered by operators tend to be modelled off the real product. Consequently, operators can use free versions of games as a way to advertise and promote their real gambling product to new users (Derevensky & Gainsbury, 2016; Frahn et al., 2015). For gamblers, particularly those experiencing problems, advertising is related to an increase in internet gambling (Derevensky, Sklar, Gupta, & Messerlian, 2010). Those with higher internet usage or who play simulated versions are more likely to be exposed to advertising, pop-ups, emails and other advertising material encouraging them to engage with gambling related content or play the real thing (Abarbanel et al., 2017; Frahn et al., 2015; King et al., 2010; Sévigny, Cloutier, Pelletier, & Ladouceur, 2005).

A study by Abarbanel et al. (2017) explored the types of gambling advertisements captured by young adults (aged 25 and under) who used social media daily over a one week period. The majority of the advertisements were for social casino games, and were generally presented via the social media platform Facebook. The authors suggested that the advertisements were designed to appeal to younger demographics and were considered to glamorise gambling and the experience of winning. The advertisements were said to normalise gambling; encouraging people to play and play “for free”. Other authors suggest that advertisements offered via simulated gambling games are likely to increase exposure to gambling related content and encourage people to play the real thing (King et al., 2010), while creating and perpetuating erroneous beliefs or cognitive distortions about gambling (Derevensky & Gainsbury, 2016; Derevensky et al., 2010; Frahn et al., 2015; King et al., 2010; Sévigny et al., 2005). Many of the messages included in pop-up features promoting real gambling tend to misrepresent chance and indicate that winning or receiving a prize is the most likely outcome from gambling for money online (King et al., 2010), drawing comparisons with wins experienced in free play versions (McBride & Derevensky, 2009).

Sévigny et al. (2005) surveyed demo gambling products to explore the types of messages received by consumers of free-play, practice games. Simulated game play resulted in numerous messages via emails or pop-up messages that tended to focus on the winning outcomes associated with the demo product and encouraged people to play with real money. The majority of messages included fictitious information about gambling that suggested skill and practice would increase the likelihood of winning. Slogans such as “practice really does make perfect” or “you are one of our smartest fun players” not only encourage betting persistence, but provide people with greater confidence and promotes an illusion of control over gambling outcomes that may tempt consumers to apply their newly developed ‘skills’ to real gambling. The promotion of erroneous gambling beliefs in advertising and promotions on simulated gambling games is concerning given the relationship between cognitive distortions about gambling and gambling problems (Barrault & Varescon, 2013; Blaszczynski & Nower, 2002; Myrseth, Brunborg, & Eidem, 2010). Those who are vulnerable to developing

biases or distortions about gambling may be more likely to show greater gambling persistence and take more risks when gambling with real-money.

In their study of youth exposure to gambling advertisements, (Derevensky et al., 2010) found that most advertisements contained messages that fostered distorted views of gambling such as winning is easy, the chance of winning is high and that gambling is an easy way to get rich. However, other research has shown that the extent of exposure naturally varies depending on one's level of gambling participation. For instance, in the British population study (Ipsos MORI, 2009), those who participated in monetary and simulated gambling were more likely to remember seeing gambling advertisements. It is also likely that online media usage may determine the extent to which one is exposed to gambling material. Youth are significant consumers of digital and online media. The British population survey of youth between the ages of 12-15 years showed that 96% of the sample had used the internet in the seven days prior to the study and over a quarter of the sample reported to have spent at least 8 hours online (28%), while one in ten adolescents would report more than fifteen hours (11%) of internet activity a week (Ipsos MORI, 2009).

Greater familiarity and consumption of digital web based technologies means that youth are also more likely to be exposed to gambling related content (King et al., 2010). Despite some youth not participating in monetary or simulated gambling, given that most engage with the internet regularly and for extended periods of time, they would naturally be exposed to gambling content and advertising (Abarbanel et al., 2017; McMullan & Kervin, 2012; Monaghan, Derevensky, & Sklar, 2008; Phillips & Blaszczynski, 2010; Sévigny et al., 2005) that normalises gambling as fun, everyday activity (Derevensky & Gainsbury, 2016; McMullan & Kervin, 2012).

Greater exposure to gambling related content may facilitate more positive attitudes towards gambling. This is particularly concerning for youth as the sharing and inviting of social casino game play is likely to generate the idea that gambling is socially acceptable (King et al., 2010; Ladd & Petry, 2002), but the familiarity with web-based processes may also generate ease when contemplating exchanging money on web-based servers compared to older generations who may be more cautious (Griffiths, 2003). Further, some suggest that their competence with using digitalised media and web-based products may be transferred into a gambling space (King et al., 2014a). Results from the British prevalence study exploring youth gambling suggest that those who spend more than eight hours a week online are more likely to spend money on gambling games and participate in free-play gambling products. Therefore, higher rates of internet use as seen in younger populations may be contributing to their participation in gambling activities (Ipsos MORI, 2009).

While youth are more likely to be exposed to gambling related content through natural use of the internet and social media (Abarbanel et al., 2017; de Freitas & Griffiths, 2008), engagement with these technologies is happening at a much earlier age (Griffiths, 2003; King et al., 2010; Ladd & Petry, 2002). However, there have been no studies conducted that explore how early exposure to simulated gambling games may impact on gambling problems over

time (King & Delfabbro, 2016b). Research shows that those who begin gambling at an earlier age are more likely to be problem gamblers (Delfabbro, King, & Griffiths, 2014; Derevensky & Gupta, 2007; Griffiths & Parke, 2002; Gupta & Derevensky, 1997; Volberg, Gupta, Griffiths, Olason, & Delfabbro, 2010). Adolescents who have been found to display pathological gambling behaviours report having started gambling as early as 9 or 10 years of age (Derevensky & Gupta, 2007; Griffiths & Parke, 2002; Gupta & Derevensky, 1997). Simulated gambling products may therefore serve to reinforce gambling behaviour from a much younger age given the increased access to gambling content, leading to greater gambling consumption and problems later on (King et al., 2014a).

Misrepresents Real Gambling Experiences

As with promotions or advertising that accompany simulated gambling products, the simulated game itself can also promote false perceptions or expectations surrounding the chances of winning and the involvement of skill in gambling (Gainsbury, Hing, et al., 2014; King et al., 2010; Monaghan, 2009). For instance, social virtual-world games that include gambling themed content as a side feature often market gambling as fun, lucrative and exciting, and can misrepresent the level of skill required (King et al., 2010; Monaghan, 2009). Another issue with social casino games is that many of the outcomes are not based on predetermined odds or even by chance, but can be tailored to the individual users' playing behaviour (Gainsbury, Hing, et al., 2014). Unlike real gambling products, there is no regulation regarding return to player rates and therefore, many of these games, particularly practice or demo gambling products, do not provide an accurate picture of the return to player rates experienced in real gambling products (Frahm et al., 2015; King et al., 2010; Sévigny et al., 2005).

Return to player rates are calculated by the amount of money won divided by the amount of money wagered and multiplied by 100 (Frahm et al., 2015; Sévigny et al., 2005). In order for the gambling vendor to receive a profit, the return to player rate would need to be below 100%. Australian slot machines typically have a return to player rate of 85-90% (Frahm et al., 2015). Internet gambling's return to player rates are can be higher than traditional forms due to minimal overhead expenditures by operators and greater competition for patronage (Williams & Wood, 2007). Simulated gambling games' return to player rates tend to be even higher given the absence of money and there being no need to conserve profits by the manufacturer. Consequently, when players transition from demo or practice modes to the real product to gamble for money, this payout rate decreases significantly (King et al., 2010; Sévigny et al., 2005).

Sévigny et al. (2005) investigated the payout rates of 117 online roulette sites and found that 39% provided users with inflated payout rates. They then randomly selected 5 sites who had inflated payout rates over 100% for both 100 and 500 trials to determine whether these rates were maintained when gambling for real money. Their results showed that 4 of the 5 sites presented payout rates under 100% in real gambling sessions. These inflated payouts on simulated games may represent a strategy whereby vendors try to reinforce real-money

gambling by providing a lucrative experience on simulated versions (Sévigny et al., 2005). Inflated payout rates in demo modes create an illusion not only that the game is more profitable than it is, but also that gamblers have a better chance of winning online (Sévigny et al., 2005; Wood, Williams, & Lawton, 2007). This misconception is then used when marketing the real-version as promotions and advertising focus on the winning outcomes experienced within the demo mode to try to entice players to engage with the real version to gamble with real money (McBride & Derevensky, 2009; Sévigny et al., 2005).

Research suggests that outcomes experienced during simulated or free-play gambling can influence monetary gambling behaviour (Bednarz et al., 2013; Frahn et al., 2015). In their study of free-play gambling and monetary gambling, Bednarz et al. (2013) showed that participants in the losing free-play condition played significantly fewer trials on the online roulette game gambling for money compared to all other experimental conditions. These findings were supported by Frahn et al. (2015) who also investigated how exposure to practice modes influenced perceptions of control, gambling persistence and risk-taking using slot machines. One-hundred and twenty eight participants were allocated to either a no practice condition or one of three experimental conditions: a loss condition, a profit condition and a profit plus pop-up condition where participants would periodically receive an encouraging message. Messages were designed to promote greater confidence by misrepresenting skill; for example: “you’re one of our most skilful players!” They then compared each group’s behaviour when playing with real money. Contrary to Bednarz et al. (2013), Frahn et al. (2015) found no effects of free-play on later gambling persistence when gambling with real-money, but showed that those who had inflated payout rates (the winning and winning plus pop-up condition) placed larger bets compared to the control group. These results were not replicated when comparing the loss and control group suggesting that demo modes may only result in riskier gambling when presented as profitable. That is, demo sites that include inflated payout rates are likely to result in greater expenditures when people transition to gambling with real-money.

While many simulated gambling products offer advertisements or messages that promote fictitious beliefs about one’s ability to gamble (Derevensky et al., 2010; Frahn et al., 2015; King et al., 2010; Sévigny et al., 2005), (Frahn et al., 2015) suggests that fictitious beliefs may be a secondary concern when it comes to influencing real gambling. Their results showed no differences between profit conditions where participants did or did not receive pop up messages promoting fictitious beliefs or an overconfidence in a person’s ability to gamble. Instead, it appears that this misrepresentation of winning is more likely to determine how a person subsequently gambles with real-money. Based on their observations of betting behaviours, Frahn et al. (2015) further suggested that participants failed to notice the change in payout rate from the free-play mode to the real-money modes as they did not change their bet sizes during non-profitable phases. They concluded that mere exposure to practice modes themselves are not likely to generate risk-taking behaviour unless they involve inflated payout rates. Given that many demo or practice games provide inflated payout rates compared to the real version, those who engage with free-play products may be at risk of spending more money and showing greater gambling persistence when playing for real-money.

As many of these free-play products provide inflated return to player rates (Frahm et al., 2015; King et al., 2010; Sévigny et al., 2005), and even adults have failed to identify rate reductions in real modes (Bednarz et al., 2013; Frahn et al., 2015), free-play modes may generate early misconceptions in youth about the chance of winning when gambling with money. In line with research on adult populations (Bednarz et al., 2013; Frahn et al., 2015), some authors suggest that practice games that accurately portray the return to player rate of real monetary games may serve to promote safer gambling behaviours and knowledge about the chances of winning on chance based games (King et al., 2014a). However, as many do in fact incorporate inflated payout rates it is likely that practice games may serve to encourage or facilitate misconceptions about gambling. When adolescents progress to real-monetary forms, it is likely they will underestimate the consequences associated with gambling and potentially make riskier gambling decisions based on feeling more confident in their ability to gamble.

Provides an Early Big Win

Experiencing a big win early in one's gambling career is linked with the development of gambling problems (Wood et al., 2007). Big wins serve to reinforce gambling and develop expectations about gambling outcomes (Delfabbro et al., 2014). Demo or practice modes can provide consumers with a “big win” due, in part, to inflated pay out rates and the rapid event frequencies offered by digitisation (Wood et al., 2007). However, simulated gambling games can also be manufactured to provide players with in-game outcomes, such as big wins, depending on their prior experiences within the game (Gainsbury, Hing, et al., 2014). Many simulated games can actually artificially create situations where consumers receive a big win early in their gambling session (King et al., 2010). Whether a big win in simulated gambling has a similar effect as big wins experienced in real-gambling is yet to be determined.

The impact of big wins in early gambling experiences has been demonstrated in a study by Delfabbro and Thrupp (2003) who surveyed 505 adolescents between the ages 15-17 years on their gambling experiences. Those who reported experiencing a big win (\$100-\$760) within their first few gambling attempts were significantly more likely to display a higher gambling frequency in adolescence. Forty-five percent of those classified as regular gamblers (n = 74) reported experiencing a big win early in their gambling career. These wins were also shown to be associated with gambling intentions. Those who experienced a big win early, were more likely to agree with statements that suggest that when they turn 18 they would visit adult gambling venues, gamble more than they do now, and would definitely gamble more regularly. They also said that they intended to try internet gambling in the future. Other research shows that youth who may be classified as problem gamblers were more likely to report having a large win in the early stages of gambling (43.5% compared to 38.2% of at risk and 11.0% of not at risk gamblers) (Lambos & Puglies, 2007). Internet based gambling products - either simulated or monetary – provide big wins early in gambling episodes (King et al., 2014a). Whether simulated outcomes reinforce future gambling in the same manner as wins received from monetary gambling remains unclear, however, they may serve to promote fictitious ideas about the chances of winning or receiving comparable wins in real gambling environments.

Dissociation with/Insensitivity to Money

A concern relating to internet gambling is that the psychological value for electronic cash is less than if one were to gamble with “real” physical cash (Griffiths, 1999, 2003; Griffiths, Parke, Wood, & Parke, 2006). Electronic money, or “e-cash” has the propensity to disrupt a gambler’s perceptions of the value of their money holdings that would otherwise regulate expenditure, resulting in persistent gambling and a dissociation with how much one is spending (Griffiths et al., 2006). Simulated gambling games allow people to gamble with credits that are presented to them in the same manner as internet gambling websites, but have no value beyond that given within the game itself to unlock features or in-game experiences. As with chips or tokens used in casinos or electronic money with internet gambling, virtual currency may desensitise people to the value of real-money.

Virtual currency is a key feature in many simulated products, whether they be demo or practice modes or social, virtual world gambling games. Simulated gambling games often provide players with an initial pool of virtual credits with which to play. Once this allocation has been exhausted, in order to keep playing, players can choose to either pay money to purchase more virtual currency, or wait a predetermined amount of time for credits to replenish (Gainsbury, Hing, et al., 2014). It is likely that when playing these simulated demo games the focus will shift to the winning outcomes rather than losses and expenditures, as the latter brings no real consequences (Floros et al., 2013). Similarly, many of these games offer a “safety net” where players can save their game or reload with a fresh supply of credits, allowing for riskier gambling with minimal consequences (King et al., 2010, p. 177). When or if people then transition to real-monetary modes, this focus on the outcome (rather than expenditure) and the lower value placed on money (represented as credits rather than currency) may cause people to engage in less considered gambling and potentially increase expenditure.

Encourages Real and Excessive Expenditure

According to a Gainsbury et al. (2014) taxonomy, to be classified as a simulated gambling game the game must be void of any financial transactions within game play. However, some gambling games (and non-gambling games for that matter) will encourage players to spend money by capping credits and encouraging in app purchase. This is known as the ‘freemium’ model, where the game might be free to play but may require or encourage in game purchases to improve the game play experience (Derevensky & Gainsbury, 2016). Gambling simulations will sometimes provide a capped amount of online credits and once this allocation has been exhausted, players are either encouraged to purchase additional credits (Gainsbury, Hing, et al., 2014; King et al., 2016) or to pursue the real gambling product (Frahm et al., 2015; Griffiths, 2003) in order to continue playing the game. While it is not mandatory to make in game purchases (Derevensky & Gainsbury, 2016), without them, the player is likely to be restricted from playing the game for a specified time period until credits are replenished (King et al., 2016).

Research suggests that financial investment in simulated game play is associated with increased game play and concurrent participation in monetary gambling (Gainsbury et al., 2016; King et al., 2016). A study by King et al. (2016) showed that of the 130 social casino game players aged 12-17 years surveyed (non-paying n = 78; paying n = 52), paying social casino players were more likely to be males, play more frequently and use a number of different simulated gambling products compared to non-paying social casino game players. Paying players also reported more frequent engagement and greater monetary investment in real gambling. Similarly, in comparing paying to no-paying social casino game players, those who paid reported more symptoms of problem gambling, and higher psychological distress compared to non-paying social casino game users. Similar findings were reported by Kim et al. (2015), with micro-transactions in simulated gambling being the sole predictor of the transition from social casino game use to monetary gambling. This was further supported by Gainsbury et al. (2016) in a sample of adult social casino gamblers. Those who reported to gamble as a direct result of simulated gambling involvement were more likely to have greater game play frequency and make in-game payments or purchases. More recent research has demonstrated similar results, with findings suggesting that the frequency and diversity of simulated game play as well as the extent of in-game purchase is related to problematic social casino game usage (Gainsbury et al., 2017).

While spending money within simulated gambling games may be comparable to spending money on any form of entertainment, such as purchasing ride tickets at an amusement park, it is likely that financial investment into a simulated gambling task may promote real monetary gambling. In their study, (Gainsbury et al., 2016) found the most common motivator for transitioning from simulated gambling to monetary gambling was to win real money. This suggests that those who make financial investments in simulated games may be more inclined to gamble for real in order to receive a return for their investment. Alternatively, many advertisements promote real gambling by advertising or offering “free credits” or bonuses when players switched from simulated games to the real gambling version (McBride & Derevensky, 2009; McMullan & Kervin, 2012; Sévigny et al., 2005). However, these offers usually come with terms and conditions that restrict a person from cashing out until they have played a predetermined number of games or received a set amount of returns. For instance, one rule identified by Sévigny et al. (2005) was that people could not cash out, or wins would not be paid until players had played a minimum number of games or a minimum amount of money had been won with the “free credits” received. They used the following example to illustrate the terms placed on “free credits”:

“Suppose a player inserts \$80 into the real play account and receives \$50 worth of free credits. The account totals \$130. It is interesting to note that if this player loses \$45, the site considers that she has lost her own money (\$45 out of \$80), and will allow for a cash out corresponding to \$35. But, if the player wins \$45 instead of losing \$45, then the site will not pay the player, claiming that she bet with the \$50 worth of free credits (not her \$80), and did not play enough games to receive the win!” (Sévigny et al., 2005, p. 157).

Not only does this strategy mean that the gambling operators can manipulate the rules to pay less to their users, but people are required to gamble longer if they wish to take advantage of the “free credits” offered to them. Someone who may be thinking about switching from a demo mode to gamble real money may therefore end up gambling more, and spending more money, than they would have otherwise due to the misrepresentation of these “free” or bonus offers.

Parental Factors and Simulated Gambling in Youth

Youth gambling is highly influenced by parental gambling participation, beliefs and attitudes. Those who have parents that gamble or approve of gambling are significantly more likely to gamble themselves (Delfabbro & Thrupp, 2003). Non-gamblers are also less likely to have parents or friends who gamble or approve of gambling. Environments that foster positive perceptions of gambling are more likely to result in youth experimenting or engaging with gambling related activities. These environments can also determine the extent to which youth participate in gambling activities and experience difficulties. For instance, regular gamblers are far more likely than non-regular gamblers to have approving families (Delfabbro & Thrupp, 2003) and 80% of youth problem gamblers report having parents who gamble (Ipsos MORI, 2009).

Compared to other consumptive and potentially harmful behaviours (i.e., cigarettes, alcohol and drugs), gambling does not seem high on the agenda in terms of issues discussed with children and adolescents (Ipsos MORI, 2009). This is particularly concerning as many youth have reported gambling with their parents or a family member (Derevensky & Gupta, 2007; Ipsos MORI, 2009). Further, those whose first gambling experiences were with their parents are more likely to show a greater interest in gambling (Splevins, Mireskandari, Clayton, & Blaszczynski, 2010). Parental gambling behaviours has also been related to participation in free-play or demo products. Of respondents in the British survey of youth who stated they liked to play simulated gambling games, 32% had parents who gambled and 47% believed their parents would condone gambling (Ipsos MORI, 2009). However, results from a study by King and Delfabbro (2016a) suggest that while parental influences are instrumental in facilitating monetary gambling, simulated gambling engagement tended to be unsupervised by parents. They further suggest that engagement with simulated gambling products is more likely to occur in isolation or with peers with minimal parental input. This is concerning, particularly for youth who have parents that may not support gambling involvement, as parents are unable to instil accurate ideas about chance and probability or monitor simulated game usage.

Discussion

The increasing dependence on portable media devices for work and play, and the widespread availability of a diverse range of simulated gambling products through such platforms, has presented new avenues through which gambling and gambling problems are likely to manifest. While these simulated gambling products are relatively new compared to

traditional forms of gambling, they have infiltrated the marketplace and have been readily adopted by young, impressionable consumers (Derevensky & Gupta, 2007; Griffiths & Wood, 2007; Hardoon et al., 2002; Ipsos MORI, 2009; King et al., 2014a; McBride & Derevensky, 2009). Very little is known about how simulated gambling is likely to impact gambling problems for the next generation.

Many authors have voiced concerns regarding simulated gambling products for youth and adolescents, questioning how products may impact on gambling initiation and the development of gambling problems (Derevensky & Gupta, 2007; Griffiths, 2003; Ipsos MORI, 2009; King et al., 2010, 2014a; Messerlian et al., 2004; Williams & Wood, 2007). Numerous studies have found associations between simulated gambling involvement, monetary gambling (Dussault et al., 2017; Gainsbury et al., 2016; Griffiths & Barnes, 2008; Kim et al., 2015; King et al., 2016) and gambling problems (Gainsbury et al., 2016; Hardoon et al., 2002; Ipsos MORI, 2009; King & Delfabbro, 2016a; King et al., 2014a). However, the causal relationship is yet to be fully understood.

Chapter Conclusion

Compared to older populations, younger generations are more likely to be “tech savvy” and less tech-phobic when it comes to online activities (Griffiths, 2003, 2005). As younger generations grow up in a media-orientated environment, the intergenerational impact of simulated gambling is yet to be realised. Given the increasing popularity and availability of these products (King et al., 2010, 2014a), policymakers have expressed growing concerns about how practice and standalone gambling games may impact on the development of gambling problems (Gainsbury, Hing, et al., 2014).

Research gaps remain in understanding the financial models that underpin simulated gambling games, and how they extract payments from consumers. Some simulated games are promotional vehicles for real gambling, whereas others are stand-alone products. Little is known about the marketing of these products to consumers; particularly youthful consumers; and how they might contribute to objective harm. While simulated games take many forms, it is important to recognise that they are united by a core feature of superficial resemblance to in-venue gambling, and particularly EGM gambling, while not providing the potential for monetary payout of wins.

This review demonstrates that simulated gambling involvement may encourage and promote monetary gambling; a finding largely based on correlational research using cross-sectional methodologies. There is a need for research to consider the impact of simulated gambling on monetary gambling from a causal perspective. Understanding how people transition between simulated and monetary gambling will allow for both researchers and policymakers to better address the potential consequences of simulated gambling for young consumers (Derevensky & Gainsbury, 2016)

Chapter 2 Scoping Survey and Longitudinal Experiment

Introduction

Casual video-game entertainment is popular on handheld computing platforms; notably including the iOS and Android mobile operating systems. About 10% of people's time in use of mobile platforms, including smartphones and tablets, is devoted to playing games (Lipsman, n.d.). Gambling simulations are a popular example of mobile games, although these simulations rarely involve tangible rewards. Instead, people play the games for "points" that are redeemable for extra features, continued play, or are considered to be attractive simply for their superficial resemblance to real-money games. One study suggested that as many as 3.8% of adolescents have used simulated electronic gaming machines (King, Delfabbro, Kaptsis, & Zwaans, 2014b).

Mobile games have potential threats and opportunities with regard to problematic gambling involvement. Since the games do not involve real-money rewards, and often little in the way of tangible rewards, they are less prone to causing direct harm than real-money gambling. Gambling harm includes problems related to excessive time or money spent on the activity, which impacts on the gambler, their close others or the community (Neal, Delfabbro, & O'Neil, 2005). Mobile gambling games can involve excessive time spent on the games, although the monetary outlay is usually limited. Since mobile games involve less opportunity for direct harm, there is the potential to recommend these games as a relatively benign substitute to people who are having trouble controlling their gambling expenditure. Qualitative evidence suggests that simulated versions of electronic gaming machines on digital devices are sometimes used as a substitute product in an attempt to reduce time spent at gambling venues and gambling expenditure (Thorne, Goodwin, Langham, Rockloff, & Rose, 2016).

The countervailing threat of simulated mobile gambling games is their potential to be a gateway into real-money gambling involvement. The games can involve outsized payouts relative to real-money games (King, Delfabbro, & Griffiths, 2010), since the points accumulated in the games are not redeemable for cash. Consequently, the simulated games may encourage people to see wins in real-money gambling as more likely for them. The receipt of these outsized payouts may encourage irrational beliefs in luck, skill and the potential for success at real-money gambling. Moreover, the simple involvement in simulated gambling, as an enjoyable activity, can make the superficially similar experience of real-money gambling more appealing.

The purpose of the present study was to examine evidence for both the potential positive outcome and the potential negative outcome associated with simulated gambling: the potential for simulated mobile games to reduce real-money gambling involvement, and the potential for these same games to encourage greater involvement in real-money gambling. There is the distinct possibility that the simulated games may be effective at reducing gambling involvement for some players, while also acting to increase gambling involvement

in others. In particular, we expected that people with pre-existing gambling problems might proactively use such games as a substitute for real-money gambling in an attempt to shield themselves from harm. In contrast, people with few or no problems might find that their experience with these games gives them greater confidence of success with real-money gambling, leading to greater involvement in real-money gambling.

Hypotheses

In order to examine these possibilities, an initial scoping survey was administered to examine the history of people's engagement with both real-money gambling and simulated mobile gambling games. By limiting our focus to 18-29 year old participants, we were able to find people who were potentially exposed to these games as adolescents. We hypothesized that people with early and frequent exposure to these simulated games would initiate gambling earlier, spend more on gambling, and have more gambling related harms compared to people who had played simulated games later in life and less frequently.

In addition to the scoping survey, we invited the same set of participants to take part in a 6 month study where they completed a mini-survey each week (i.e., for 24 weeks). By random assignment, some participants played a simulated game of our design, Lucky Lolly Slots, each week for at least 5 minutes. The purpose was to compare real-money gambling between participants who engaged in simulated play on the Lucky Lolly Slots app to a control group of participants who did not play the simulated games. Since many people who gamble regularly also play simulated gambling games, we did not try to control for the natural occurrence of simulated play outside of the Lucky Lolly Slots app that took place within both the test and control group of participants. Consequently, the study included elements of both a controlled experiment, by virtue of assignment to condition, but also a natural experiment where some participants played simulated gambling games by their own volition. For the outcomes of the study, we were interested in both assigned play (Lucky Lolly Slots) and natural variation in play (on other simulated gambling apps) potentially influencing real-money gambling. Play on gambling apps, whether motivated by assignment to condition or by natural volition, was the principal independent variable of interest. Therefore, this experiment did not prioritize the use of Lucky Lolly Slots, in particular, as the predictor of in-venue gambling above other gambling apps.

In this part of the study, we hypothesized that gamblers with pre-existing problems who were attempting to limit their real-money gambling would find simulated play to be an effective substitute for real gambling. This prediction was motivated by anecdotal reports of gamblers purposefully using simulated games in efforts to control their expenditure. In contrast, we hypothesized that those who were not trying to limit their play and/or did not have problems with gambling would be encouraged to gamble relatively more on real money gambling through their experience with the simulated game. This prediction was supported by the observation that, regardless of the win schedule of such games, players should be more likely to remember their wins than losses (Rachlin, 1990); and therefore wish to capitalise on wins by using real money – unless, as noted above, they want to control their expenditures.

Methods

Participants

Participants were recruited from two sources: an online panel provider, *Survey Sampling International* ($n = 500$), and a leading national online bookmaker ($n = 242$). The inclusion criteria specified that participants must have gambled on EGMs at least once within the prior 6 months and be aged between 18 and 29. The online panel provider sent email invitations to people in their database, aged 18-29 ($M = 24.1$, $SD = 3.4$), who had gambled at least one on non-lottery forms within the last 6 months. People who were more frequent gamblers were invited first, and the survey was closed after 500 valid responses. For the bookmaker, 10,000 email invitations were sent to active customers. Valid responses were obtained from 242 persons. Participants were compensated for each survey completion and could quit at any time. There was no compensation provided to (or from) the bookmaker for access to their customers, or for any other reason.

A total of 736 participants (421 male) successfully completed the initial Scoping Survey, which was delivered online via the SSI Web platform. Participants could complete the forms on a PC or mobile device. Subsequently, email reminders for follow-up SSI Web surveys were sent on Mondays. A follow-up reply for each week was accepted anytime between Monday and Sunday. The contact database of participants was purged of anyone who did not complete at least the first weekly follow-up survey. Five-hundred and fifty-six (314 male) participants went on to provide valid data for at least one of 24 weekly follow up surveys. Participants provided an average of 12.4 weeks ($SD = 8.6$) of repeated measures data, yielding a total of 6,904 valid cases for analysis. The number of responses per participant varied considerably: about 20% of participants providing only 1-2 responses, and 7.5% of participants responded to all weekly surveys. However, the responses rate per week was relatively constant declining only slowly from week 1 (386 responses) to week 24 (238 responses).

The average age of respondents was 24.7 ($SD = 3.3$). Of these participants, 268 (48.2%) were allocated to the treatment group, and 174 (31.3%) indicated they were actively trying to reduce their gambling. According the Problem Gambling Severity Index (PGSI), the sample included a relatively balanced number of non-problem, low-risk, moderate-risk and problem gamblers (24.3%, 27.2%, 26.4% and 22.1%, respectively). Participants in the sample included 10.0% who gambled specifically on EGMs at least weekly, 15.4% who gambled 2-4 times a month, 22.8% who gambled monthly, 32.7% who gambled less than monthly, and 19.2% who hadn't gambled on EGMs within the last 6 months (although everyone had at initial screening).

Design and Procedure

For the Scoping Survey (see Appendix A), our goal was to analyse the retrospective reports of participants' play on simulated mobile EGM games and compare those to the timing and frequency of their engagement with real-money gambling. If simulated gambling games lead to greater engagement with real-money gambling, the expectation is that app-play (simulated

gambling) should precede gambling. Moreover, early and frequent play on these apps, adjusting for cohort effects, should predict earlier engagement with gambling and likewise greater gambling involvement.

The scoping survey, as the first part of this study, can only provide correlational evidence to support a potential link between app-play and real money gambling. Therefore, scoping survey participants were also invited to take part in a 24 week experiment where only some participants, selected at random, would play simulated gambling apps (48.2% of sample). We measured whether some participants, even in the control condition, might play “other” gambling-related apps, as opposed to the Lucky Lolly Slots app that was assigned to them. Therefore, our experiment included some features of control, by virtue of random assignment, but also some component of a natural experiment by virtue of the fact that some people independently chose to play their own selection of simulated gambling games. Because of the ubiquity of such games, we considered it a fair and practical compromise to not attempt to control people’s usage of “other” gambling-themed apps. Ultimately, the outcomes analysed here involved examining app-play on both Lucky Lolly Slots, as randomly assigned, as well as aggregated play on other gambling-themed apps.

Data Analyses. For the scoping survey, we employed simple linear regression, with transformations of the outcomes as noted, to examine the relationship between early simulated gambling on apps, and later engagement with real-money gambling. For the 24 weekly survey responses, our goal was to understand the potential links between the outcome of *Time Playing on real pokie machines* (TPP) and three measures of ‘app’ play: the number of *Lucky Lolly Slots Sessions* (LLS), *Time Playing simulated-EGM apps* (TPA), as well as *Time on Non-pokie apps* (TNPA). The distribution of all four measures was zero-inflated and overdispersed; that is, the measures were non-normal, they included a point mass at zero, as well as non-negative values with positive skew. Our analyses are therefore either based on rank-order correlations, which are insensitive to distributional characteristics; or two-stage hurdle models, which include a binomial stage predicting probability of the score being non-zero, as well as second stage predicting the non-zero values, conditional on the score being non-zero. We employed linear models in the second stage using a natural log transformation of all four play measures. To take into account clustering of observations within individuals, we employed (generalized) linear mixed effects (LME) models in both stages. Unlike classical repeated measures regression, LMEs require no particular additional methods (e.g. imputation) to handle missing data.

For the 24 week longitudinal experiment, we recorded the number of sessions; that is the number of times the app was opened and played with at least 1 spin; and number of bets made on the Lucky Lolly Slots App. From a theoretical point of view, the mechanism by which app play is presumed to influence other variables is through psychological involvement – which we expect to be best indicated by the number of sessions using the app. Initial investigation also suggested that the number of sessions spent using app had a more regular distribution (i.e. less over-dispersion) than number of bets. Accordingly, we focused on number sessions spent playing app for subsequent regression and correlation analyses.

[Measures and Apparatus](#). The survey measures are detailed in Appendixes A and B and described as needed in the analyses below.

For the experiment, some participants were assigned to play the Luck Lolly Slots app. This EGM simulator was developed by CQUniversity for research purposes. It operates on a mobile device, iOS or Android, and was created with the help of the development company, Headjam. The game is a 3 reel EGM, which is programmable for different configurations of wins, losses and features (e.g., free spins, jackpots, etc.). For the purposes of the present study, the game was programmed with approximately 0 expected returns over the long run and a random sequence of play outcomes (rather than pre-determined). Participants started the game with 50,000 credits, and could be in increments of 25, 50, 100, 150, 200, or 250. Participants could multiple their bets by betting on 1-9 win-lines. Fourteen (14) different symbols paid-off in amounts ranging from 1 to 1000 credits. A jackpot prize was available for 3 coins on the pay line, which had a payoff of 20,000 credits. This jackpot was moderately infrequent, but likely to appear with 15+ minutes of play.

Results

Sample Descriptives

Table 2-1 shows descriptives and correlations for the key variables employed in the subsequent regression analyses.

TABLE 2-1 DESCRIPTIVES AND SPEARMAN CORRELATIONS BETWEEN KEY VARIABLES

	min	max	median	mean	std.dev	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Age [1]	18	29	26	24.96	3.25	-							
Gender(male) [2]	0	1	1	0.55	0.5	0.03	-						
Education level [3]	0	7	3	3.1	1.94	0.17	0.07	-					
Actively attempting to reduce? [4]	0	1	0	0.31	0.46	-0.02	0.01	0.1	-				
EGM gambling prior month [5]	0	6	1	1.67	1.35	-0.05	-0.01	-0.01	0.24	-			
Time playing pokie apps (TPA) [6]	0	40	0	1.35	4.64	-0.03	-0.05	0.05	0.28	0.45	-		
Time playing non-pokie apps (TNPA) [7]	0	146.57	1	3.42	8.54	0.01	0.05	0.03	0.08	0.08	0.33	-	
Time playing pokies (TPP) [8]	0	50	0	1.04	3.91	-0.02	-0.03	0.02	0.21	0.51	0.71	0.25	-
Time playing Lucky Lolly Slots (LLS) [9]	0	53	0	0.49	1.78	0.04	0.03	-0.02	-0.02	0	0.01	0.09	0.02

Research Q4: What are the general patterns of usage for our mobile Pokie-app? Who uses such apps, and what are the times and places where they are used?

Over all participants, 634 weeks were recorded in which persons played the Lucky Lolly Slots App (LLS) at least once. Although people were asked to play LLS-app only once, the median number of play sessions was 2. The median number of bets placed per week was 68. The median time playing the app was 4 minutes. Figure 2-1 illustrates the distribution of the number of sessions spent each week playing the Lucky Lolly Slots App. As is common for most zero-bounded, intensity-based measures, the distribution was approximately exponentially distributed.

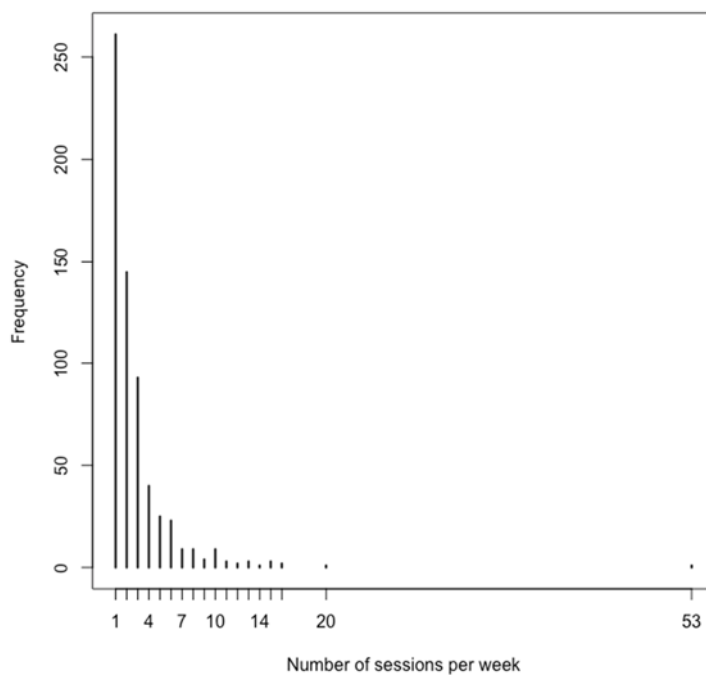


FIGURE 2-1 THE DISTRIBUTION OF THE NUMBER OF SESSIONS SPENT EACH WEEK PLAYING THE LUCKY LOLLY SLOTS APP

Figure 2-2 shows a similar distribution for the number of bets made on the Lucky Lolly Slots App, for those players who used the app that week. For visual purposes, the x limits are bounded at 1000 bets, however, the distribution continues to the right. As noted earlier, the number of bets made is more highly over-dispersed (more skewed) than number of sessions.

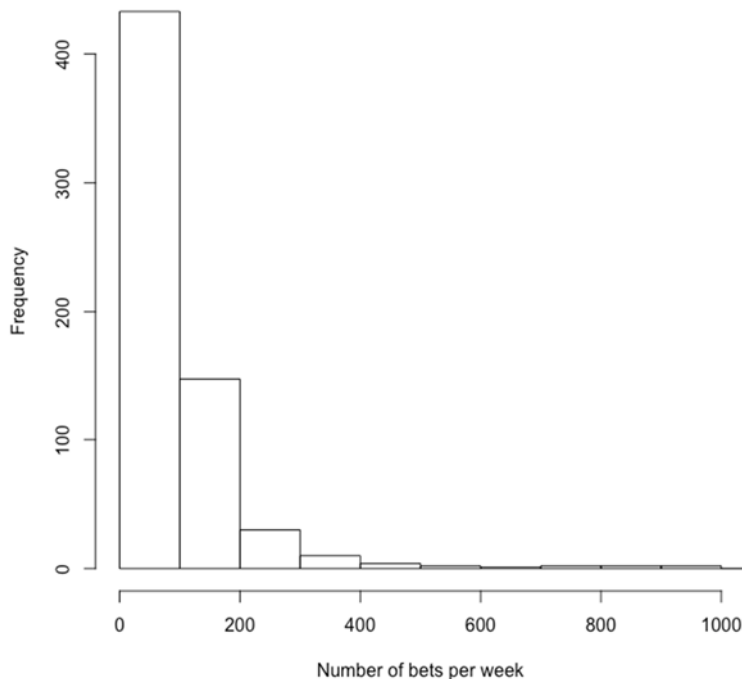


FIGURE 2-2 THE DISTRIBUTION OF THE NUMBER OF BETS PLAYED EACH WEEK PLAYING THE LUCKY LOLLY SLOTS APP

Including only ‘non-zero’ weeks (in which participants used the app), the two measures of bets and sessions were correlated at $r = .732$.

Similarly dispersed distributions were observed regarding time spent playing other commercial pokie apps and non-pokie apps. The participants in the study spent 2.15 hours per week playing (non-Lucky Lolly Slots) commercial pokie apps. The average includes the 43.8% of weeks in which participants did not play commercial pokie apps at all (1595 / 3641 weekly observations). When a participant did play commercial pokie apps in a given week, they played for an average of 4.78 hours. This compares with an average of 3.60 hours overall playing non-pokie apps (or 6.06 hours, considering only weeks in which they did play).

Figure 2-3 illustrates the changes in play for all four play variables over the course of the experiment. In general, engagement in all types of play tended to decline over time. However, this effect was diminished, in later weeks, for LLS and TPP in the intervention condition.

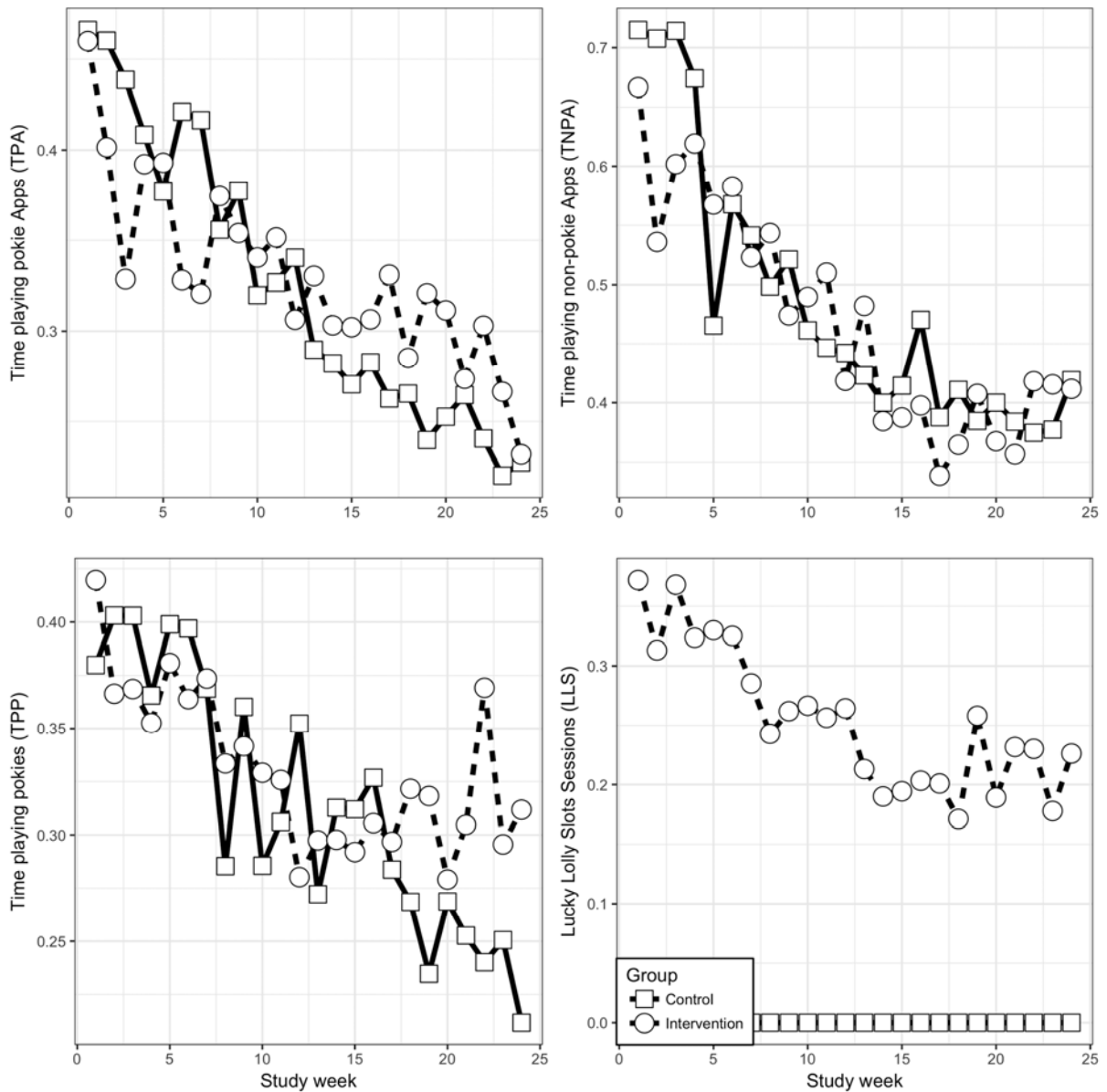


FIGURE 2-3 AVERAGE CHANGES IN PLAY IN LOG-TRANSFORMED PLAY VARIABLES OVER THE DURATION OF THE EXPERIMENT FOR CONTROL AND EXPERIMENTAL GROUPS.

The Relationship between App-play and PGSI

A series of regressions were calculated predicting various statistics on weekly app-play from natural-log PGSI scores, age, and gender (see Table 2-2 below). Only participants who completed at least one weekly survey were included in this analysis. As expected, people with higher PGSI scores played all apps more frequently, with the exception of our assigned Lucky Lolly Slots app.

TABLE 2-2 LINEAR REGRESSION MODELS PREDICTING TOTAL TIME SPENT IN APP-PLAY BY AGE, GENDER AND PGSI SCORES

	Dependent variable:			
	TPA (1)	TNPA (2)	TPP (3)	LLS (4)
Age	0.001 (0.005)	0.0004 (0.005)	0.002 (0.004)	0.002 (0.003)
Gender(Female)	0.052* (0.031)	-0.049 (0.036)	0.058** (0.027)	-0.027 (0.021)
Log (PGSI)	0.197*** (0.016)	0.085*** (0.019)	0.161*** (0.015)	-0.007 (0.011)
Constant	-0.018 (0.117)	0.435*** (0.138)	-0.036 (0.104)	0.083 (0.080)
Observations	496	496	496	496
R ²	0.227	0.048	0.200	0.005
Adjusted R ²	0.222	0.042	0.195	-0.001
Residual Std. Error (df = 492)	0.334	0.393	0.296	0.227
F Statistic (df = 3; 492)	48.211***	8.189***	41.089***	0.761
Note:	*p<0.1; **p<0.05; ***p<0.01			

Results from the Scoping Survey

Gambling-themed apps are attractive to experienced players

Using data from the scoping survey, a regression was conducted with “Have you ever played a gambling-themed app? (yes,no)” as the predictor, and “In the last 6 months, how often did you gamble on Pokies?” as the outcome. The outcome was coded 0-6; from *never* to *6-or-more times a week*. Age and gender were included as covariates. Lastly, an 8 item measure of problematic/excessive mobile phone use was also included as a covariate (Merlo, Stone, &

Bibbey, 2013), since it is conceivable that use of mobiles in general, rather than use of gambling-themed apps specifically, could predict EGM gambling. People who played gambling-themed apps at some time in the past were more frequent real-money EGMs gamblers within the last 6 months ($t = 5.27$, $p < .001$, $\text{Std}(B) = .20$). Gender, current-age and Problematic Mobile Phone Use were not significant ($t = 0.38$, $p = .71$, ns; $t = .12$, $p = .91$, ns; and $t = 1.91$, $p = .06$, ns; respectively).

For the subset of people who had played mobile gambling-themed games at some point in the past ($n = 356$), we asked “What age were you the first time you played a gambling-themed app?” In a linear regression, we used age-of-first-use as the predictor, and “In the last 6 months, how often did you gamble on Pokies? (0-6)” as the outcome. The participant’s current age and gender were included as covariates. There were no significant effects for any variable (all, $p > .05$), including age-of-first use ($t = .20$, $p = .84$, ns.).

The scoping survey also asked participants to describe themselves as either a “casual gambler” ($n = 550$), an “experienced gambler” ($n = 108$) or a “non-gambler” ($n = 78$). Excluding the self-described non-gamblers, a logistic regression predicted people’s description of themselves as an experienced gambler, the outcome, based on their play on gambling-themed apps (some or none). Age and gender were included as covariates. People who played gambling-themed apps were more likely to describe themselves as an “experienced gambler” than non-players (21.6% vs 11.2%, respectively) (Wald = 12.74, $p < .001$, $\text{Exp}(B) = .45$). A larger proportion of males (21.4%) described themselves as an “experienced gambler” compared to females (8.6%; Wald = 17.45, $p < .001$, $\text{Exp}(B) = .34$). However, age proved non-significant (Wald = .21, $p = .57$, $\text{Exp}(B) = 1.01$, ns).

In summary, having played gambling-themed apps predicted a participant’s frequency of current gambling on real-money EGMs. People who had played gambling-themed apps were also more likely to describe themselves as an “experienced gambler”. However, there was no significant relationship between the early-age use of such apps and current frequency of real-money gambling on EGMs.

Research Q1: Does simulated-gambling app use in adolescence and young adulthood generally precede real gambling, or conversely, are existing gamblers more often drawn to use such apps?

The scoping survey asked if people played gambling themed apps prior to their 13th birthday, and how frequently they gambled for real money prior to their 13th birthday. Table 2-3 below illustrates that people who played gambling-themed apps prior to the age of 13 were also more likely to have gambled frequently for real-money prior to the age of 13 ($\chi^2 (3) = 22.46$, $p < .001$).

TABLE 2-3 CROSSTABULATION OF REAL-MONEY GAMBLING AND GAMBLING-APP PLAY PRIOR TO 13TH BIRTHDAY

Thinking back to my youth, I gambled for money prior to my 13th birthday:		Age first-played gambling apps			Total
		age <13 first gambling apps	age 13+ first gambling apps		
Never	Count	3	223	226	
	% column	15.0%	66.4%	63.5%	
Once or twice	Count	11	82	93	
	% column	55.0%	24.4%	26.1%	
More than twice but less than a dozen occasions	Count	4	21	25	
	% column	20.0%	6.3%	7.0%	
On at least a dozen occasions (or more)	Count	2	10	12	
	% column	10.0%	3.0%	3.4%	
Total	Count	20	336	356	
	% column	100.0%	100.0%	100.0%	

In order to determine if early exposure to mobile apps predicts early engagement with real-money gambling, a regression was conducted on the outcome of the frequency of playing pokies between ages 13 and 18 (1 = Never to 9 = Everyday). The regression controlled for gender, current age (for cohort effects), and gambling prior to age 13 (1 = never to 4 = On at least a dozen or more occasions). The principal predictor was whether the participant had potentially also played on mobile gambling-themed apps prior to the age of 13 (yes or no). The regression is shown in Table 2-4. As illustrated, prior use of apps significantly predicted earlier engagement with real-money gambling in adolescence ($t = 2.32$, $\text{Std}(B) = .08$, $p = .2$).

TABLE 2-4 FREQUENCY OF GAMBLING (13-18) BY GENDER, AGE, GAMBLING PRIOR TO 13, AND APP PLAY PRIOR TO 13

	Unstandardized		Standardized		
Model	Beta	Std. Error	Beta	t	Sig.
Constant	1.73	.72		2.40	.02
Gender (Female)	.03	.17	.01	.16	.87
Age	.01	.03	.01	.37	.71
Gambling for money prior to 13	.99	.12	.29	8.14	>.01*
App Play Prior to 13	1.24	.53	.08	2.32	.02*
* p < .05					

24 Weekly Surveys and App-play

Research Q2: Is use of our EGM app a positive predictor of real gambling, or alternatively a substitute product that negatively predicts subsequent gambling?

We found a high week-by-week Spearman correlation between TPP (*Time Playing on real pokie machines*) and TPA (*Time Playing simulated-EGM apps*), $\rho = .71$, $p < .001$, a weaker relationship between TPA and TNEA (*Time on Non-EGM apps*) $\rho = .25$, $p < .001$, and a non-significant relationship between TPA and LLS (number of *Lucky Lolly Slots Sessions*), $\rho = .02$, $p = .058$. Thus, the strongest week by week relationship in activity was between time playing real pokies, and time playing commercial pokie apps. The p -values must be taken as indicative only, since these bivariate correlations do not take into account autocorrelation (i.e. between observations on the same variable from one week to the next) in both variables – an issue that will be addressed below.

Some complication is needed in order to explore these effects further in multivariate models, since the weeks in which participants did not play EGMs at all lead to ‘zero-inflation’, which cannot be addressed through transformation of the response. Accordingly, for all multivariate models, we conducted two-stage hurdle modelling, which comprises two independent regression models:

- 1) a binomial stage, that predicts the probability of some play versus no play, employing all available data
- 2) A numeric stage, that predicts the amount of play, conditional on the quantity being non-zero; employing only cases in which the response is non-zero

Even excluding zero cases, all duration variables (TPP, TPA, TNPA, LLS) were positively skewed, and approximately log-normally distributed – as is usually the case. Therefore, all duration variables, as well as the PGSI were transformed using the formula $\log(x + 1)$. For both stages, we employed generalised linear mixed effects models, in order to account for variability in

the DV between participants, and heterogeneity between subjects in the main effects of interests. That is, we specified a random intercept between participants, and a random slope for any duration variables (TPP, TPA, TNPA, LLS) that appeared as predictors (fixed effects) in each model.

Table 2-5 summarises hurdle (G)LME regression models predicting TPP from app play (i.e. TPA, TNPA, LLS) in the same week, entered either singly or simultaneously. In models (7) and (8), random slopes were specified for all three app-play duration IVs. Between-subjects covariates are also included in these models. Random intercepts by participant are included, as well as random slopes for each of the three repeated-measures predictors, when they were included in the model. A pattern of results similar to the Spearman correlations is evident, in which TPA, followed by TNPA and LLS in effect size, positively predicts TPA. These analyses also suggest that simulated-gambling app use co-varies positively with play on real EGMs. However, as noted above, autocorrelation in the DV precludes for strong inference to be made from these results.

TABLE 2-5 SUMMARY OF LINEAR MIXED EFFECTS MODELS ASSESSING IMPACT OF PRIOR SIMULATED-GAMBLING APP USE AND REAL EGM PLAY IN CURRENT WEEK

LME Models: DV = Time spent playing pokies (TPP) in current week								
Predictors:	Time playing EGM apps (TPA)		Time playing non-EGM apps (TNPA)		Number sessions Lucky Lolly Slots (LLS)		All Predictors	
	Binomial (1)	Linear (2)	Binomial (3)	Linear (4)	Binomial (5)	Linear (6)	Binomial (7)	Linear (8)
TPA	7.557** (0.532)	0.590** (0.028)					7.092** (0.520)	0.554** (0.030)
TNPA			2.129** (0.216)	0.264** (0.030)			0.809** (0.210)	0.072** (0.024)
LLS					1.046** (0.275)	0.077* (0.035)	0.641 (0.341)	0.059* (0.028)
PGSI	0.346* (0.161)	0.036* (0.017)	0.772*** (0.198)	0.088** (0.023)	0.773** (0.184)	0.109** (0.025)	0.415* (0.169)	0.038* (0.016)
Actively trying To reduce	-0.394 (0.297)	-0.056* (0.029)	0.373 (0.364)	-0.001 (0.040)	0.421 (0.334)	0.027 (0.045)	-0.475 (0.313)	-0.061* (0.029)
EGM play in Month prior	1.055** (0.107)	0.053** (0.011)	1.706** (0.139)	0.073** (0.015)	1.576** (0.127)	0.097** (0.016)	1.128** (0.112)	0.051** (0.011)
(Intercept)	-5.043** (0.270)	-0.010 (0.030)	-6.820** (0.385)	-0.039 (0.042)	-5.517** (0.320)	0.018 (0.045)	-5.688** (0.314)	-0.040 (0.030)
N	6,904	1,916	6,904	1,916	6,904	1,916	6,904	1,916
LL	-1,955.10	-73.109	-2,245.58	-285.73	-2,391.52	-432.80	-1,923.16	-46.122
AIC	3,926.20	164.21	4,507.17	589.47	4,799.05	883.61	3,880.32	128.24
BIC	3,980.92	214.24	4,561.89	639.49	4,853.76	933.63	3,996.59	228.28

Note: *p<0.05; **p<0.01

In order to address the issue of autocorrelation, we considered further lagged time-series models in which activity in the prior week (t-1) predicted activity in the subsequent week (t). In Table 2-6, the dependent variable in all models was TPA(t), and TPA(t-1) is always included as a predictor to account for autocorrelation in the DV. Thus, Table 2-6 reflects a test of whether or not TPA, TNPA and LLS provides useful information in predicting subsequent

changes in TPA in the following week. TPA was a significant predictor of increased TPA in the following week.

TABLE 2-6 SUMMARY OF LINEAR MIXED EFFECTS MODELS ASSESSING INFLUENCE OF SIMULATED-GAMBLING APP USE DURING PRIOR WEEK TO PREDICT REAL EGM PLAY IN SUBSEQUENT WEEK

LME Models: DV = Time spent playing pokies (TPP) in following week								
Predictors:	Time playing EGM apps (TPA)		Time playing non-EGM apps (TNPA)		Number sessions Lucky Lolly Slots (LLS)		All Predictors	
	Binomial (1)	Linear (2)	Binomial (3)	Linear (4)	Binomial (5)	Linear (6)	Binomial (7)	Linear (8)
TPA(t-1)	2.267** (0.296)	0.118** (0.026)					2.138** (0.308)	0.101** (0.026)
TNPA(t-1)			0.492** (0.154)	0.056*** (0.019)			0.123 (0.159)	0.037 (0.020)
LLS(t-1)					0.107 (0.245)	-0.008 (0.027)	0.202 (0.283)	-0.002 (0.028)
TPP(t-1)	1.690** (0.196)	0.181** (0.020)	2.212** (0.181)	0.201** (0.018)	2.433** (0.169)	0.227** (0.017)	1.671** (0.201)	0.163** (0.020)
PGSI	0.341* (0.143)	0.034* (0.017)	0.475** (0.155)	0.047** (0.018)	0.490** (0.152)	0.048** (0.018)	0.354* (0.140)	0.033 (0.017)
Actively trying To reduce	-0.185 (0.263)	0.021 (0.030)	0.341 (0.283)	0.030 (0.031)	0.164 (0.275)	0.041 (0.031)	-0.039 (0.262)	0.023 (0.031)
EGM play in month prior	1.065** (0.099)	0.036** (0.011)	1.169** (0.110)	0.039** (0.011)	1.145** (0.107)	0.038** (0.012)	1.057** (0.099)	0.038** (0.011)
(Intercept)	-4.583** (0.243)	0.303** (0.030)	-5.041** (0.297)	0.286** (0.032)	-4.713** (0.268)	0.309** (0.031)	-4.706** (0.260)	0.293** (0.032)
Observations	6,348	1,916	6,348	1,916	6,348	1,916	6,348	1,916
Log Likelihood	-	-	-	-	-	-	-	-
Akaike Inf. Crit.	1,973.74	135.93	-2,013.27	129.13	-2,025.98	120.36	-1,963.55	140.57
Bayesian Inf. Crit.	3,965.49	-251.86	4,044.55	-238.27	4,069.96	-220.72	3,963.10	-243.15
	4,026.29	-196.28	4,105.35	-182.69	4,130.76	-165.14	4,084.70	-137.55

Note: *p<0.05; **p<0.01, Bracketed values indicate standard errors.

Whilst these results are suggestive of a directed causal relationship between TPA → TPP, they do not discriminate between a directed causal effect and either (a) potential bi-directionality, or (b) the influence of a third, unmeasured variable with autocorrelation in time (e.g. gambling urges) and could be responsible for influencing both TPA and TPP. Further evidence can be gained by comparing two partial Spearman correlations:

- 1) App → EGM: The correlation between TPA(t-1) and TPP(t), controlling for TPP(t-1)
- 2) EGM → App: The correlation between TPP(t-1) and TPA(t), controlling for TPA(t-1).

These partial correlations implement ‘pre-whitening’; that is, first removing the autocorrelation in the variable measured at (t) that is presumed to be the dependent variable (Dean & Dunsmuir, 2016). Correlation (1) quantifies the degree to which TPA provides additional information about subsequent values of TPP, whilst correlation (2) quantifies the degree to which TPP provides additional information about subsequent values of TPA. Comparison of the magnitude of these two partial correlations allows for an assessment of ‘Granger causality’. Granger causality assesses whether the relationship between the two series is likely to contain a causal element, considered from a statistical perspective. To be more precise, a variable x can be said to be Granger-causal of variable y if preceding values of x help in the prediction of the current value of y, given all other relevant information (Dean & Dunsmuir, 2016). It is often likely that ‘third variables’ are affecting both x and y at both time t and t-1 – which may be contributing to the partial correlation – but this effect can be assumed to be approximately equal in both directions. Therefore, by comparing partial correlations (1) and (2), we can assess whether there is more evidence for the proposition that TPA causes subsequent values of TPP, or alternatively that TPP causes subsequent values of TPA.

For (1), Spearman’s rank partial correlation was .272, 95% CI (.237, .304) and for (2), the correlation was .192, 95% CI (.156, .226). Given they are not markedly different in magnitude, there is evidence for either bi-directional effects, or unmeasured variables driving both TPA and TPP. However given that the confidence intervals do not overlap, prior simulated-gambling app use predicts subsequent EGM play significantly more strongly than the converse. This provides some evidence for a hypothesized causal relationship between simulated app-play and real-money gambling.

[Research Q3: Is there a difference between the effects of simulated-gambling app use on intensive/regular gamblers compared to casual/occasional gamblers?](#)

In line with the study objectives, it is relevant to know whether these effects are different for those participants who are actively trying to reduce expenditures for their gambling, and those who are not. For those actively trying to reduce expenditure with their play, App → EGM $r = .247$ (.185, .312) and EGM → App $r = .179$ (.117, .238). For those *not* trying to reduce expenditures with their play, App → EGM $r = .214$ (.164, .274) and EGM → App $r = .129$

(.082, .184). Thus, partial correlations were slightly higher for those actively trying to reduce their play *in both directions*, though not significantly so.

Discussion

The purpose of this research program was to investigate the relationship between the use of gambling-themed apps on mobile devices and gambling on real-money EGMs. EGMs are the most popular form of casino-style gambling in Australia. They are also the form of gambling that contributes to the most aggregate harm.

App Play Predicts Gambling Frequency

The results from the initial scoping survey revealed that people who had played gambling-themed apps at some point in the past had a higher frequency of play on real-money EGMs. Moreover, players who indicated that they were more experienced at real-money gambling were also more likely to have played gambling-themed apps. Therefore, retrospective accounts indicate that there is at least an association between app play and gambling intensity. This association may stem from an overall interest in such superficially similar games. For example, people who are highly attracted to the form of such games might be motivated to both play apps and gamble on real EGMs. However, there is also the potential that app-play precedes, at least in some cases, an interest in real-money gambling. There is particular concern that such gambling-themed apps being available to children might groom young people to become adult gamblers. We found that PGSI explained approximately 22% of the variance in time spent playing simulated EGM apps, as compared to about 20% of variance in time spend playing actual EGMs. This is a novel and interesting finding, demonstrating a strong association between gambling problems and use of these forms of games. The most likely explanation is that EGM apps are appealing to those who have problems with gambling. However, these apps may also contribute to the development or maintenance of gambling problems.

App Play in Childhood Predicts Early Gambling Involvement in Adolescence

Further retrospective evidence for the relationship between app-play and real money EGM gambling was found in reports from childhood and adolescence. Those who played on gambling-themed apps prior to the age of 13 were much more likely to have also gambled for money prior to the age of 13. Perhaps the most credible evidence was found in predicting adolescent gambling from play on gambling-themed apps prior to age 13. Those who played gambling-themed apps prior to age 13 nominated, on average, an earlier age at which they “gambled the most” in adolescence (13-18). This effect remained even after controlling for real-money gambling prior to the age of 13. There is highly credible evidence, therefore, that simulated-gambling app use precedes and predicts early involvement with gambling.

Longitudinal Experiment Shows Simulated-Gambling App Use Predicts EGM Gambling

While the retrospective reports outlined above are highly suggestive of a relationship between gambling-themed app use and engagement with real-money gambling, there is the potential for memory distortions in retrospective reports. In order to circumvent this common research problem, the current project also included a 6 month (24 week) trial where approximately ½ of participants were asked to play a purpose built mobile EGM game, Lucky Lolly Slots, for at least 5 minutes a week. Weekly surveys tracked real-money gambling on EGMs, as well as participants' reports of playing other EGM-themed apps. In the weeks where participants played more on such EGM gambling-themed apps, they also spent more time gambling on real EGMs. Importantly, we also found that app play in the prior week (t-1) predicted real EGM gambling in the subsequent week (t), even when controlling for EGM play in the prior week. Moreover, although EGM play in the prior week (t-1) also predicted app play in the subsequent week (t), the relationship was not as strong. This provides evidence that app-play is intensifying real-money gambling rather than being a simple consequence of an underlying motivation driving both behaviours (e.g., gambling urges).

Limitations

Play on the Lucky Lolly Slots app alone, and independent of play on other EGM-themed apps, did not significantly relate to real money gambling on commercial EGMs. Given somewhat limited play times on the Lucky Lolly Slots (LLS) app, it may have been that the LLS app was not sufficiently appealing to a broad group of participants. Many chose more personally appealing options for EGM themed games on the app stores. In the future, a more universally attractive EGM-themed app might have the power to reveal pure experimental effects; rather than the hybrid of LLS play and self-chosen apps that did relate significantly to real-money gambling.

Use of a sample of persons 18-29 years old exposes the study to the risk of cohort effects. Since the iPhone was introduced in 2007 (10 years prior to this research), many of the older participants were not likely to have played EGM "apps" prior to age 13 simply because they were not available to them. While we controlled for age as a potential confound, cohort effects might still have influenced our findings. On the other hand, it is possible that our effect sizes could have been even stronger had more of our participants had the potential for playing EGM themed apps prior to age 13.

Furthermore, it is important to recognise that retrospective reports used in these studies are subject to potential recall errors and biases. While we failed to find any interactive effects for people who are trying to reduce expenditures on their gambling, and are presumably failing to do so successfully, we cannot discount the possibility that a lack of power is responsible. It may be possible that gambling-themed apps help some people control their gambling. However, we did not find any evidence to support that conclusion. It is also important to recognise that this study included only gamblers, and thus is not a study of who migrates into

gambling based on simulated game play. Instead, it is a study of how simulated game use can affect the intensity of play on EGMs.

Chapter Conclusion

This research project has produced some of the best evidence thus far of the potential dangers of playing gambling-themed mobile apps. There is evidence of both a concurrent relationship between using these apps and gambling intensity, as well as predictive effects for app play on gambling intensity. Moreover, the same concurrent and predictive relationships are apparent in both retrospective reports and within a longitudinal design. Given that gambling-themed apps generally have no age restrictions and are frequently embedded in social media and gaming platforms (Facebook, Valve's Steam) that children and adolescents frequent, there is cause for concern about these games. In particular, it may be appropriate to consider if gambling-themed games represent too great a risk in encouraging children to engage in what is considered, for reasons of risk for harm, to be an adult activity. This research provides a useful contribution to this conversation by illustrating that gambling-themed apps, while not involving real money, are nevertheless implicated in promoting gambling-intensity in both adolescence and young-adulthood.

Chapter 3 Interviews

Research Q5: What is the player's understanding and reasoning regarding how App usage affects real gambling? What broad themes can be identified?

Online gambling games - both monetary and simulated forms - are now available across a varied range of devices, providing unprecedented wide exposure and easy access to gambling and gambling-like games for consumers (Derevensky & Gainsbury, 2016; Gainsbury, Russell, et al., 2014b). Online simulated gambling games can often be downloaded for free as an app and played without an initial charge but with additional 'credit' allowed to be purchased within the game, blurring the line between gambling and online gaming. Some of the most popular simulated gambling games are pokie-style games, often known as slots apps, with two of the top ten highest revenue iOS games apps offering simulated slots (Murphy, 2015).

The previous longitudinal stage of the current project found that those who played pokie simulation apps in one week were more likely to gamble on real pokie machines the following week. This was also the case - although to a lesser extent - for those who played non-pokie apps, in that they were also more likely to gamble on real pokie machines the following week. These results remained significant, even when controlling for real pokie gambling from one week to the next. These results can be interpreted as suggesting that playing pokie simulation apps, or any other gaming app, is not an effective coping mechanism for those that wish to limit their real pokie gambling. Playing these games may, speculatively, control gambling urges acutely, i.e. in the moment, but not chronically. However, these results do not actually tell us why people are choosing to play these games or the context in which they are playing them.

Qualitative research can help us to drill further down into the quantitative findings and understand them from the point of view of those that choose to play these pokie simulation apps. In order to put the quantitative findings into context, we wanted to explore players' understanding and reasoning regarding how app usage affects their real gambling. Gambino and Shaffer (1979) first espoused this need in gambling research, arguing that people are often not fully aware of why they engage in certain behaviours so it is important to reflect on the social and cultural context in which the behaviour is occurring, and how those that gamble understand their gambling. To this end, thematic analyses was chosen because of its focus on how individuals make sense of their reality and how their experience is influenced by the broader social context in which it is occurring. This is especially applicable when examining gambling behaviour because, as argued by Griffiths and Delfabbro (2001), it is heavily influenced by contextual factors; including but not limited to the structural characteristics of the games, the motivations and the social experience of the gambler.

Thematic analysis allows for inductive approach to identifying themes in the data (Braun & Clarke, 2006). In a practical sense, the thematic analysis was approached with a semi-structured interview guide, as described below, and a collection of "themes" were identified

as pertinent issues discussed by multiple interviewees. In this way, thematic analysis allows the data to tell its own story, independent of the researchers' prior theoretical assumptions. The outcomes of this phase of the project offer an insight into what may be happening when people play simulated pokie apps, the needs that these apps are fulfilling, and their understanding of how playing these apps influences their behaviour.

Methods

Participants

To be eligible for this qualitative part of the analysis, participants were required to have completed some portion of the 24 week experimental study. Of the 328 participants who completed the prior experimental phase, 53 indicated they would be willing to be contacted for a telephone interview regarding their experiences with playing the simulated mobile EGM. From those willing to be contacted, participants were recruited for interviews with preference given to those who had demonstrated changes, both relative increases and decreases, to their real gambling during the experimental study. A total of 20 participants took part in a telephone interview, which is consistent with guidelines for appropriate sample sizes (Baker & Edwards, 2012; Guest, Bunce, & Johnson, 2006; Marshall, Cardon, Poddar, & Fontenot, 2013; Morse, 2000), comprising 8 males and 12 females, ranging from 18-29 years in age; ($M = 25.20$; $SD = 3.861$). The characteristics of the sample are described in Table 3-1 below. In terms of problem gambling severity, the sample consisted of 5 non-problem, 5 low-risk, 6 moderate and 4 problem gamblers as measured using the Problem Gambling Severity Index (Ferris & Wynne, 2001).

Procedure

Ethical clearance was gained from the Institutional Human Research Ethics Committee (15/08-180). Twenty semi-structured interviews were conducted over a 3 week period during June 2017. The interviews were conducted via telephone by a female research worker with oversight by an experienced female, mixed methods researcher with postgraduate training in qualitative methods. The interviewer had no prior relationship with the participants apart from brief communications to schedule the appointments. The researchers had no knowledge regarding participants' results from the previous experimental phase beyond whether or not the participant experienced some (unspecified) behavioural changes.

Participants had provided informed consent during the experimental phase of the study, however, consent was re-confirmed verbally prior to commencement of the telephone interview, ensuring participants clearly understood that the interview was being recorded for research purposes, and their right to withdraw participation. Interviews ranged from 11 to 41 minutes (average interview length was 25.05 minutes), and were conducted using a mobile speakerphone that was recorded on a handheld recording device. Participants who completed telephone interviews were compensated for their time with a \$40 shopping gift-card.

TABLE 3-1 PARTICIPANT CHARACTERISTICS		
Variable	Sub-category	N
AGE	18-20	4
	21-23	2
	24-26	4
	27-29	10
GENDER	Male	8
	Female	12
COUNTRY OF BIRTH	Australia	16
	India	1
	Philippines	1
	Russia	1
	Singapore	1
EDUCATION LEVEL	Less than high school	1
	High school diploma or equivalent	7
	Some college - no degree	2
	Postsecondary non-degree award	1
	Associate's degree	2
	Bachelor's degree	7
EMPLOYMENT	Employed full time for wages	8
	Employed part time or casually for wages	4
	Self-employed	2
	A homemaker	3
	A student	3
MARITAL STATUS	Married, de facto or domestic partnership	9
	Single, never married	11
INCOME	\$2,000-\$2,499/week (\$104,000-\$129,999/year)	1
	\$1,500-\$1,999/week (\$78,000-\$103,999/year)	1
	\$1,250-\$1,499/week (\$65,000-\$77,999/year)	1
	\$1,000-\$1,249/week (\$52,000-\$64,999/year)	4
	\$800-\$999/week (\$41,600-\$51,999/year)	2
	\$600-\$799/week (\$31,200-\$41,599/year)	1
	\$400-\$599/week (\$20,800-\$31,199/year)	3
	\$300-\$399/week (\$15,600-\$20,799/year)	3
	\$200-\$299/week (\$10,400-\$15,599/year)	1
\$1-\$199/week (\$1-\$10,399/year)	3	
PGSI CATEGORY	Non-problem	5
	Low risk	5
	Moderate risk	6
	Problem Gambler	4

Following consent and an overview of the research topic, the telephone interview commenced with general discussion about participants' mobile game usage. Semi-structured

interviews were conducted using a flexible approach to interviewing that allows for personal accounts of the participants' experiences to be shared. The interview structure was based on a guide that ensured a comprehensive coverage of key aspects such as general mobile game usage, experiences with mobile gambling simulations and Lucky Lolly Slots, and their perceptions of how mobile gambling simulations impact their gambling urges and experiences. While conversations were allowed to progress naturally based on participants responses, the guide was used to probe relevant topics and prompt participants when they were struggling to develop meaningful responses to broader, overarching questions. A copy of the interview guide is included as Appendix C.

Audio recordings for each of the interviews were professionally transcribed by an external quality assured transcription service. Once received, transcripts were cross-checked against audio recordings by the interviewer to correct any errors and remove identifying information. Transcripts were thoroughly reviewed and annotated to highlight comments or insights expressed by participants relevant to the research topic. For each transcript, these annotations were then collated into a memo detailing authors' initial interpretations of participants' experiences. Audio recordings, transcripts and memos were then uploaded to NVivo Version 11 to facilitate coding and analysis.

Analysis

Thematic analysis was utilised to facilitate a focus on the most salient themes of relevance to the research question (Braun & Clarke, 2012; Braun & Clarke, 2014). A six phase, inductive analysis was undertaken, as recommended by Braun and Clarke (2012). In the first phase, the researchers familiarised themselves with the data through reading and annotating the transcripts. Memos were generated for each participant and on the overall data set and shared between the researchers. Initial codes were generated using open coding of the transcripts. The codes generated were both *in vivo* and based on conceptual and theoretical frameworks that represented sensitising concepts for the researchers (Bowen, 2006) moving from descriptive to interpretive in nature. In the third phase codes were compared and clustered where they shared a unifying feature to reflect a meaningful and coherent pattern that existed within the data. Emergent themes were then examined to determine the relationship between them and identify second order themes that existed. The themes were then reviewed against the data in a recursive process in the fourth phase of analysis due to the size of the data set. Themes were named in collaboration between the two researchers, ensuring that they each had a singular focus, but also built to form a cohesive understanding of the phenomena. Finally, the findings were sequenced to ensure they reported the data in a logical and meaningful way.

Findings

Four second order themes (Fereday & Muir-Cochrane, 2006) were identified within the data that explained the influence of playing simulated gambling apps on participants. These are illustrated in Table 3-2. Each of these themes refers to a gambling pathway, explaining how

simulated gambling involvement impacted on participants’ real gambling experiences and attitudes. The four main pathways, identified were: 1) experimenting with gambling 2) transitioning to gambling, 3) changes to gambling behaviour, and 4) development of gambling problems. The findings are reported in relation to each of these themes. Participants’ data is identified by their age, gender and PGSI category for context.

TABLE 3-2 THEMES IDENTIFIED IN THE ANALYSIS

<ol style="list-style-type: none"> 1. Experimenting with gambling <ul style="list-style-type: none"> · Exploring the appeal of gambling · Social migration · Perception of a risk free environment 2. Transitioning to gambling 3. Changes to gambling behaviour 4. Development of problem gambling

Experimenting with Gambling

Participants identified their initial use of simulated gambling apps often as a form of experimenting with gambling or game forms (e.g., Poker Machines, Roulette, etc.). Three clustered themes were identified (cf. Fereday & Muir-Cochrane, 2006) :

1. Exploring the appeal of gambling
2. The social migration of experimenting with simulated gambling
3. The perception of a risk free environment

Exploring the appeal of gambling

Gambling is a popular recreational activity in Australia. The motivation to engage with simulated gambling apps is related to participants desire to explore what they saw as the appeal of gambling. This appeal or interest may have been a personal desire to play, or an interest in understanding the appeal to others.

“I guess because you sort of want to know what it's all about, and why is this such a thing. So test it out and see why is the rest of the world doing this all the time.” Participant 17 (28, F, NP)

This motivation was sometimes related to a time when participants were still underage (< 18), and unable to gamble legally, but aware of the gambling of the adults around them. For example, a participant described herself as having grown up with a family ritual of going out for dinner and the adults disappearing to play the pokies. The allure of gambling was related to the restricted and adult nature of the activity but socially facilitated. As she explained:

“The fact that you can't actually go and even really see any of the pokie machines - and everyone kept going in there when I was younger.” Participant 9 (19, F, LR)

Once she got a smartphone, she downloaded the simulated pokie app to explore her interest whilst she was still too young to legally gamble. This interest in exploring gambling was described even more strongly by a young female participant who is experiencing problems with gambling:

“It was just like - I was just intrigued really. So that's why I chose to kind of explore and see what was out there.” Participant 4 (21, F, PG)

The appeal of gambling is created in the broader context of people's lives. The influences include media representations of gambling and its consequences, the attitudes and behaviours of friends and family, and the personal characteristics of the individual. Participants identified the appeal of gambling generally, but also in relation to the influence of family and friends specifically. The role of social migration formed a broader theme that extended beyond just the influence of appeal.

[The social migration of experimenting with simulated gambling](#)

The influence of family and friends on people's motivation to try gambling simulations was identified by a number of participants. Gambling and simulated gambling were often part of social occasions, a shared recreational activity, or a competitive activity amongst participants' friend- and family groups. Participants shared that when friends or family were playing, this served not only as a motive to initiate play, but to increase their participation. This was true across many participants with different problem-gambling severity levels. A non-problem gambler described the effect of family members with simulated gambling games:

“Yeah, well my family does. They've got it on their phones and stuff as well, so I tend to play it more when they are playing it.” Participant 7 (29, F, NP)

She described a sense of competition, being the first person to “discover” a game, or competing over achievements within the game between family members. This increased her enjoyment of the simulated apps. In contrast, a participant experiencing problems with gambling was also influenced by other people, but quickly lost interest without the thrill of the win:

“My partner and his friends were going to the casino as well. They're like, oh, we're going to play Blackjack. I was like, oh, okay. It kind of just intrigued me to see what it was like to play

it on my phone as well. I think I only played it once and then it just didn't really interest me. I think it's because I didn't win." Participant 4 (21, F, PG)

Social migration occurred not only from the influence of family and friends, but also due to broader societal influences. Participants mentioned the influence of seeing other people playing games on their devices that looked enjoyable and then seeking that game out. One participant (26, F, PG) described her interest as stemming from seeing people playing poker and observing that they were very good. She believed this was the most powerful influence for her to experiment and try her luck.

Whilst a number of participants described actively seeking out the simulated gambling apps, others came across them incidentally on searches for free apps or listed as the most popular downloads at the time. The notion of a free app was appealing to many participants, even if they went on to spend actual money on in-app purchases. For other participants, friends and family would recommend games or invite them to play through social media accounts. Overall, social migration played a strong role in the initiation of experimenting with gambling through simulated gambling apps.

The perception of a risk free environment

The nature of a simulated environments were described by participants as being initially perceived as safe because money was not being wagered. For some participants, that was the appeal of the simulated apps. As one participant explained:

"I guess it was like a no-risk sort of thing. So while you're playing it's not like you're losing any of your own money, like going to the casino or playing an online pokie game or something. All the money was simulated, so it was like you start off with - however much you started off with - and you choose to bet what you want. When you win, it's just, you know... and when you lose it's not a big deal because it's not actually real money." Participant 2 (18, F, NP)

Other participants identified this lack of risk as fun, labelling it as "free". At times the credits won in a simulated game were perceived as having more value than a number on a screen or the accomplishment of a level. Some participants described them in terms of other people's "money" that was "lost". The distinction between real and simulated money was blurred, as evidenced in one participant's description of their motive for playing simulated apps:

"That's kind of just my motivation. It was just fun to earn a lot of money in such short period of time or lose a lot of money in such short period of time, but not bear the consequences." Participant 3 (29, M, MR)

Another participant when describing her level of investment in the games also described the loss of someone else's money, before correcting herself to identify it as points.

"So even though I will be invested, but it's not as much as the paid version. Because I know if I lose that's the money that I've put into it that I've lost. But with the free version I know that

I haven't lost any money, I've just lost - I mean, not my money anyway, money from the actual company, or the points. Yeah, that's where it comes. That's really how it changes." Participant 6 (29, F, NP)

Participants described using the apps to help them understand how the game works or to experiment with different features without the risk of either monetary loss or embarrassment if playing in a land based venue in the view of others. This was not just restricted to gambling forms that require some skill, such as blackjack or poker. One participant described using a simulated app to experiment with how EGMs work:

"The first time I ever played pokies I was like what the heck is this? I'd never got it. Playing those sort of games, I guess, gave me a bit more of an understanding." Participant 2 (18, F, NP)

A male (29), low risk gambler described how he used the simulated apps to "figure out" how the system and payouts worked on EGMs. He experimented with different lines and bets, growing confident to experiment on real EGMs in ways that he would not have otherwise because he had seen it as too risky.

For other participants the distinction between the simulated apps as a low risk or safe environment and actual gambling was not clear. One participant (25, F, NP) who did not enjoy them without the potential excitement of winning actual money, considered simulated gambling products as a means to hook people into gambling. Another participant saw them as an extension of gambling and distanced herself from their use, explaining:

"I've never been a huge gambler, so it's not really my thing - if that makes sense." Participant 13 (27, F, LR)

For one low risk gambler, this avoidance was based on having no desire to "open the door" to electronic gaming machine gambling by engaging with simulated pokies. His awareness of personal vulnerability developed from experiences with another's gambling problems and perceptions relating to personal circumstances:

"I don't want to find out if I could be addicted to them, that's the... - if that makes sense. I'm worried that if I start playing them that you sort of go, 'well okay if I can win on this and this is easy,' I'll transition to real life pokies."... "I mean from seeing other people play pokies and the addiction that comes with that, I've just sort of gone 'well okay I don't even want to get close to that stage'."... "I guess it stems from - so I work in a casino, that's my job and although I don't work with pokie machines, I guess a wider thing in the casino industry is that staff are more susceptible to gambling issues and I guess I've never really wanted to tempt myself. Like, I've never wanted to even entertain the idea. I see something like, if you're playing a simulated pokie, I can see you getting the same sort of rush that you would and that transitioning to real life pokies." Participant 15 (29, M, LR),

The notion of the safe environment was further challenged by the reports of in-app purchases to allow for more achievement by a number of participants. The perceived “free” simulated app was no longer free.

Transition to gambling

The influence of simulated gambling apps on the transition to real gambling play was largely dependent on whether participants were winning or losing in the simulated environment. As part of their experimentation, some participants had used simulated gambling apps to not only develop their familiarity but to test strategies for winning, even when gambling on simulated EGM games.

Whilst losses on simulated apps were reported as neutral events, no emotions were involved because there was no real loss, wins were met with varied emotional responses. One participant described the motivation of the jackpots and her response to a big win as both happiness and regret, regret that the money won is not real:

“I hit jackpot a lot of times. That's where my regret comes in. That why is it not a real gambling game? I think the jackpots that really, really motivates me. I love it that I hit probably a few hundred thousand. I imagine if it's in real life, oh how lucky it will be.” (26, F, PG)

The fantasy of what the win would be like in real life was shared by participants from all gambling risk severity levels. One non-problem gambler (28, F) described how nice it would be if she was really earning the money before quickly correcting herself to describe it as winning. The difference, she explained, was that when playing a real EGM, she did not win. Another non-problem gambler was clear in the difference between winning on the simulated gambling apps and on real EGMs:

“You kind of just think that yeah, if it's that easy I might. But you know what - for sure that it's not going to be so.” Participant 19 (25, F, NP)

The fantasy of translating the win to a real life EGM seemed more achievable as gambling severity increased. At the low risk level one participant was able to separate the simulated experience from real life:

“It does get exciting when you win a lot and you think that it could be good in real life, but it doesn't work that way, unfortunately.” Participant 13 (26, F, LR)

Another low risk participant (29, M, LR) described their belief that they could translate their success and try what they believed was a winning strategy on a real EGM. A moderate risk gambler (28, F) identified that the simulated gambling made her feel that the outcomes playing real EGMs would be similar to on the apps. Whilst a participant experiencing problems with gambling explained:

“So I feel like with the app you see yourself always winning. So you kind of want to encourage that in a real life environment as well. I think that the app kind of pushed me towards going on the poker machines because I obviously wanted to do it and see if I could win as much money as I did in the app, I guess. It didn't happen. I'm not a millionaire but, you know.” Participant 4 (21, F, PG)

This experience was reported across genders. A male participant experiencing problems with gambling reported similar experiences of urges created by winning on simulated apps:

“Sometimes if you've been on the pokie game, as in on the mobile, you're like maybe I can win it in real life. So, you go and try your luck and find out that it's not true.” Participant 5 (27, M, PG)

Participants from different gambling severity levels reported the use of simulated gambling apps increased their urge to gamble with money. A key difference though between the participants was the point in their description when they acknowledged the likelihood of winning on real gambling compared to simulated gambling was significantly lower. Participants with higher levels of gambling severity sometimes described this as a realisation after they had gambled, as evidenced above: *“it didn't happen”* and *“find(ing) out that it's not true”*. Participants with lower levels of gambling severity described this realisation as occurring before they gambled, as illustrated by the description from a non-problem gambler:

“When I look at the free version and then I see the money and the points going up there, I think the same thing would happen in the real version. So yes, that makes me want to play the real version. But then I know that the free version always - it always makes it look more easier than what it is in the actual paid version.” Participant 6 (29, F, NP)

Some participants reported that they used the simulation as a way of moderating the desire to gamble with money. They explained that they could get a similar experience from the simulation that they sought from real gambling without risking or losing money. As one participant described:

“Every time when the craving hits I will just go to my phone, rather than I have to basically go out of the house, go to the casino and play it and really lose the money. The games actually satisfy my craving without sacrificing my financial.” Participant 1 (26, F, PG)

The effect was through curbing the urges or a different way to pass the time. A male participant explained the effect:

“Probably because you just - you look for the... - to pass the time away. Because sometimes that's what pokies are for anyway, the real pokies, to pass the time away, pass 10 minutes away.” Participant 5 (27, M, PG)

This suggests that understanding people's gambling motives may be important to understanding the differences in how simulated gambling apps affect people's real gambling

activities. A number of participants described passing time, filling in time and spare time as being spent on the apps.

Changes to Gambling Behaviour

The first two themes identified the pathways from simulated gambling to the initiation or motivation to participate in actual monetary gambling. The third theme examines the pathways between simulated and actual gambling. Whilst some participants had identified the role of simulated app play on their urges to gamble, other participants drew clear distinctions between their simulated and real gambling. This was not limited to the non-problem or low risk gamblers, as one moderate risk gambler explained:

“Well, I just view them as different things, so I never really categorise them as being the same, to be comparable. Like I said, one is real money and one is not.” Participant 20 (28, M, MR)

Another moderate risk gambler distinguished his playing style on simulated gambling apps as being more risky, with larger amounts wagered:

“The way you wager on the simulated ones, it's not the same as the real ones, it's just the same look but it wagers a lot different - like I think you can gamble in like \$36,000 hits and stuff rather than dollar hits and stuff like that.” Participant 7 (24, M, MR)

A number of participants across the non-problem, low risk, and moderate risk categories drew clear distinctions between real money and the apps. They allowed themselves to take these risks when it was “just credits”, playing maximum lines and bet sizes, and extending their play time beyond what they could in a real gambling environment. It was a chance to indulge in play behaviours that would be too risky using real money; their money. While there was an expressed desire to gamble the same way, most were concerned with losing money and therefore tended to stick to their self-imposed limits.

For a problem gambler, however, the use of simulated gambling encouraged her to make riskier bets when gambling for real money:

“By playing the app I feel, like, I wanted to put way more than what I probably would have. Me, usually, I just put \$5 in and I'm happy. I'll just be on five cent hits all the time. But I feel like I wanted to put \$1 hits. I put in \$20. You know what I mean? I put the highest bet on. Then I chose all lines as well, all nine lines as well. So when I came to obviously playing it in real life, I obviously wanted to do the same. I think that when you - with the game, I wanted to always play it. So I feel like that kind of encouraged me to really go out in a real life environment and play it as well.” Participant 4 (21, F, PG)

She described the way playing simulated gambling apps encouraged her to increase her bet size as she chased the wins she had experienced on the simulated games:

“I think when you can increase the bet or choose your own bet, that's the kind of features that I really wanted to play in real life as well. So the app kind of encouraged me to increase my bet more than what I usually would have because I knew from the app so I wanted to try it in real life. Then obviously I personally didn't know about the lines. So I'd put nine lines, I think. Yeah, nine lines on the Lucky Slots, yeah. So I wanted to do the same, which you obviously can't in a casino on a poker machine but I still wanted to kind of do the same and increase my chances of winning more money. But usually I wouldn't have spent as much I did, but I feel that kind of - because I played the app and I kind of saw myself winning money all the time, and never really losing a lot of money, that I want to do it rather than in a virtual environment, in a real life environment.” Participant 4 (21, F, PG)

Real gambling experiences were also reported to impact on simulated gambling behaviour. One participant (29, M, MR) reported being just as conservative when playing simulations as when they would gamble on real pokies. They would need to remind themselves that it was a simulation and no money was at stake, which would lead to greater experimentation and placing larger bets:

“So I kept on selecting less lines, so trying to make the game last longer, but then I had to tell myself oh hang on, what do I care? I can just select all nine lines because I'm not losing real money.” Participant 3 (29, M, MR)

Overall there was a difference in the pathways between the simulated and real gambling environments for different levels of gambling severity. Whilst a distinction and separation of the two forms was reported by people with lower levels of severity, people experiencing problems with gambling reported an interaction that could cause riskier behaviour on real gambling, and potentially the experience of more gambling harm.

Development of problem gambling

The final theme captured how participants associated simulated game play experiences with problem gambling. Factors such as personal vulnerability, the vulnerability of others, and how participants make sense of the transition from simulated gambling to monetary gambling, and then to the development of gambling problems were included.

Participants reported that simulated game play made them aware of the risks of gambling. Some participants could identify the ease with which it was possible to transition from free-play to monetary gambling. These insights were related to an appreciation that for some, simulated gambling is likely to influence a person's real gambling and were generally expressed in relation to other people, rather than reflections on oneself, across the levels of gambling severity:

“...suspect that it might have an effect on someone who enjoys pokie type things for their own sake. But I'm not that kind of person. For me no, it would not.” Participant 11 (20, M, NP)

“I see something like if you're playing a simulated pokie I can see you getting the same sort of rush that you would and that transitioning to real life pokies.” Participant 15 (29, M, LR)

“...because I know some people would play it, then go to a real life environment and spend their money or continue putting money in a machine thinking that they're going to hit the jackpot and things like that. But then they end up spending more money than what they would have won anyway.” Participant 4 (21, F, PG)

Playing the simulation provided some participants with a greater appreciation and awareness as to how “others” may become addicted to pokie play based on their own experiences with the simulation. Again, these observations were expressed in terms of another person’s gambling rather than on their own.

“I can understand how people get addicted to those sort of things and addicted to gambling.” Participant 18 (27, F, LR)

The expression of these beliefs as relating to others may have been influenced by social desirability bias. Other participants were able to recognise and express the influences in terms of their own behaviour. One participant described how he had removed the simulated apps from his phone based on the concerns he had about changes in his gambling behaviour:

“I think that was the biggest - the thing I found that why I'd probably never put a mobile app on my phone re: pokies is that I realised that that was actually getting me to go to real ones, so I haven't downloaded one since.” Participant 16 (29, M, LR)

There were participants from each level of gambling severity who reported that simulated gambling had made them more aware of their own gambling behaviour. Participants reported becoming aware of their tendency to spend more than they could afford to lose (27, F, MR), that playing simulated gambling apps had occasionally made them want to gamble with real money (19, F, LR), and the influence of their parents gambling (21, F, PG). For some participants this increased awareness had led to a new resolve to impose limits on their gambling. As one participant outlined:

“I'm definitely more aware of not just mindlessly being at a pokie. Like setting a definite limit, right I'm only going to play this much, I'm going to stop if it gets to this point, or once I finish my drink that's it, we're going to cash out and go do something else.” Participant 15 (29, M, LR)

Chapter Conclusion

The qualitative analysis supports and explains the quantitative findings of the scoping survey and 24 week longitudinal experiment covered in the previous chapter. In particular, there was a strong recognition of the role social migration paths play on simulated gambling apps, and that apps motivated many players to engage with real money gambling. While there was some recognition, particularly amongst lower risk gamblers, that performance on simulated

games might not be repeated in casino environments, many were motivated to try their perceived luck as experienced in the simulated games to win real-money rewards. Moreover, people saw the simulated games as an opportunity to better understand the real money games, and experiment with how to play in what was perceived to be a risk-free environment.

This qualitative phase of the research adds importantly to our understanding of the influence of gambling simulations on engagement with real money gambling, and tends to reinforce the dangers that were exposed. Although some participants noted the apps as a potential substitute activity, more people, and particularly those experiencing problems with gambling identified how the apps might encourage them - or hypothetical “others” - to increase their involvement with gambling at venues.

Chapter 4 Final Summary, Implications and Future Directions

This report detailed a program of research into how gambling-themed apps influence real-money gambling in childhood, adolescence and young adulthood. Our findings provided a remarkably consistent and surprisingly damning picture for such apps, including:

- 1) In retrospective accounts, children aged under 13 who play gambling-themed apps were also more likely to gamble for money
- 2) In retrospective accounts, young people (13-18) who played apps prior to age 13 were more likely to have early heavy involvement with gambling
- 3) In a longitudinal experiment, in weeks where young adults (18-29) played longer on gambling-themed apps, they also gambled longer in venues
- 4) In a longitudinal experiment, in weeks where young adults (18-29) played longer on gambling-themed apps, they were also more likely to gamble for longer in venues in the subsequent week

Moreover, our in-depth investigation through interviews with people who either increased or decreased their gambling over the course of the trial (N = 20) provided additional evidence for app-play motivating people to “try (their) luck” at real-money gambling. People noted that gambling-themed apps were often introduced to them as children by friends and family. Many mentioned that winning on these apps caused them to feel regret that they were not playing for real money in a venue. People further noted that they used the apps to better understand the games in an environment that they perceived to be risk-free. Lastly, gamblers used gambling-themed apps to experiment with different playing styles, sometimes using much riskier betting strategies and betting larger amounts than they would in a real venue.

It is important to note some major limitations for these studies. The retrospective accounts can be affected by recall biases and cohort effects. The longitudinal experiment showed that a combination of experimentally assigned play on our Luck Lolly Slots app and self-chosen play on other EGM-themed apps was related to real money gambling. However, play on the Lucky Lolly Slots app alone, as experimentally assigned, did not independently relate to real money gambling. This failure could be due to a lack of power or lack of global attractiveness for this particular formulation of an EGM-themed game.

Implications

There are clear policy implications for these findings. First, there is a risk that these gambling-themed games are normalising gambling amongst children and adolescents. In particular, there is evidence to suggest that such games motivate real-money gambling in adolescence, which is a time when people are most vulnerable to gambling-related problems. Gambling themed games and advertisements for such games are commonly promoted to children on

app stores, including iTunes, and within other popular free-to-play games. This practice should be eliminated as there is now evidence that playing simulated gambling games contributes to involvement in real-money gambling. Age restrictions should apply. There is a potential role for legislative intervention to prevent future harm, especially if private industry refuses to take action. Fortunately, there is a bottleneck where Google Play and Apple iTunes dominate the app market, creating a realistic opportunity for these two providers to choose to impose such restrictions by fiat. However, the market for PC software is more uncontrolled than that for apps, and gambling-themed content is often embedded into software used by children in the form of mini-games. This practice, although potentially less widespread than gambling-themed apps, may represent a threat that is transnational and more difficult to tackle through corporate responsibility or national legislative action.

Future Directions

There is clearly more work to be done in detailing the risk of gambling-related apps and their impact on children and adolescents. In particular, the current study relied on retrospective accounts for these younger cohorts, which are notoriously subject to recall errors and systematic memory distortions. Although the ethical considerations are difficult, it would be helpful to survey and interview adolescents and children directly to better understand the interaction between play on gambling-themed apps and real-money gambling. A true longitudinal design that tracks children into adolescence, and adolescents into early adulthood would provide the most definitive evidence for the risk that gambling-themed apps pose.

Study Conclusion

The current study represents the first authoritative evidence, to our knowledge, that implicates gambling-themed apps as a risk-factor for real-money gambling. Our evidence comes from multiple perspectives, including retrospective accounts as well as a longitudinal experimental study with good ecological validity and a reasonably long time frame (6 months). One study or research program should not, alone, be considered sufficient to answer all questions on this complex topic. Nevertheless, there is good evidence provided here to highlight the dangers of such apps, and it should be taken as a motivation for action.

References

- Abarbanel, B., Gainsbury, S. M., King, D., Hing, N., & Delfabbro, P. H. (2017). Gambling Games on Social Platforms: How Do Advertisements for Social Casino Games Target Young Adults? *Policy & Internet*, *9*(2), 184–209.
- Albarran Torres, C., & Goggin, G. (2014). Mobile social gambling: Poker's next frontier. *Mobile Media & Communication*, *2*(1), 94–109.
- Baker, S. E., & Edwards, R. (2012). *How many qualitative interviews is enough? National Centre for Research Methods review paper*. Swindon, UK: Economic Research Council.
- Barrault, S., & Varescon, I. (2013). Cognitive distortions, anxiety, and depression among regular and pathological gambling online poker players. *Cyberspace*, *16*(3), 183–188.
- Bednarz, J., Delfabbro, P., & 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*(3), 381–395.
- Blaszczynski, A., & Nower, L. (2002). A pathways model of problem and pathological gambling. *Addiction*, *97*(5), 487–499.
- Bowen, G. A. (2006). Grounded Theory and Sensitizing Concepts. *International Journal of Qualitative Methods*, *5*(3), 12–23.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101.
- Braun, V., & Clarke, V. (2012). Thematic Analysis. In H. E. Cooper, P. M. Camic, D. L. Long, A. T. Panter, & Rindskopf D & Sher K (Eds.), *APA handbook of research methods in psychology, Vol 2: Research designs: Quantitative, qualitative, neuropsychological, and biological*. (pp. 57–71). Washington: American Psychological Association.
- Braun, V., & Clarke, V. (2014). What can “thematic analysis” offer health and wellbeing researchers? *International Journal of Qualitative Studies on Health and Well-Being*, *9*, 26152.
- Dean, R. T., & Dunsmuir, W. T. M. (2016). Dangers and uses of cross-correlation in analyzing time series in perception, performance, movement, and neuroscience: The importance of constructing transfer function autoregressive models. *Behavior Research Methods*, *48*(2), 783–802.
- de Freitas, S., & Griffiths, M. (2008). The convergence of gaming practices with other media forms: what potential for learning? A review of the literature. *Learning, Media and Technology*, *33*(1), 11–20.
- Delfabbro, P., King, D. L., & Griffiths, M. (2014). From Adolescent to Adult Gambling: An

- Analysis of Longitudinal Gambling Patterns in South Australia. *Journal of Gambling Studies / Co-Sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming*, 30(3), 547–563.
- Delfabbro, P., & Thrupp, L. (2003). The social determinants of youth gambling in South Australian adolescents. *Journal of Adolescence*, 26(3), 313–330.
- Derevensky, J. L., & Gainsbury, S. (2016). Social casino gaming and adolescents: Should we be concerned and is regulation in sight? *International Journal of Law and Psychiatry*, 44, 1–6.
- Derevensky, J. L., & Gainsbury, S. M. (2016). Social casino gaming and adolescents: Should we be concerned and is regulation in sight? *International Journal of Law and Psychiatry*, 44, 1–6.
- Derevensky, J. L., & Gupta, R. (2007). Internet Gambling Amongst Adolescents: A Growing Concern. *International Journal of Mental Health and Addiction*, 5(2), 93–101.
- Derevensky, J. L., 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 and Addiction*, 8(1), 21–34.
- Dussault, F., Brunelle, N., Kairouz, S., Rousseau, M., Leclerc, D., Tremblay, J., Dufour, M. (2017). Transition from playing with simulated gambling games to gambling with real money: a longitudinal study in adolescence. *International Gambling Studies*, 1–15.
- Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating Rigor Using Thematic Analysis: A Hybrid Approach of Inductive and Deductive Coding and Theme Development. *International Journal of Qualitative Methods*, 5(1), 80–92.
- Ferris, J., & Wynne, H. (2001). *The Canadian problem gambling index*. Canadian Consortium for Gambling Research. Retrieved from <http://ccgr.ca/sites/default/files/CPGI-Final-Report-English.pdf>
- Floros, G. D., Siomos, K., Fisoun, V., & Geroukalis, D. (2013). Adolescent Online Gambling: The Impact of Parental Practices and Correlates with Online Activities. *Journal of Gambling Studies / Co-Sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming*, 29(1), 131–150.
- Forrest, C. J., King, D. L., & Delfabbro, P. H. (2015). The Gambling Preferences and Behaviors of a Community Sample of Australian Regular Video Game Players. *Journal of Gambling Studies / Co-Sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming*. <https://doi.org/10.1007/s10899-015-9535-0>
- Frahn, T., Delfabbro, P., & King, D. L. (2015). Exposure to Free-Play Modes in Simulated Online Gaming Increases Risk-Taking in Monetary Gambling. *Journal of Gambling Studies / Co-*

Sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming. <https://doi.org/10.1007/s10899-014-9479-9>

- Gainsbury, S. M., Hing, N., Delfabbro, P. H., & King, D. L. (2014). A taxonomy of gambling and casino games via social media and online technologies. *International Gambling Studies*, *14*(2), 196–213.
- Gainsbury, S. M., King, D. L., Russell, A. M. T., Delfabbro, P., & Hing, N. (2017). Virtual addictions: An examination of problematic social casino game use among at-risk gamblers. *Addictive Behaviors*, *64*, 334–339.
- Gainsbury, S. M., Russell, A., Hing, N., Wood, R., Lubman, D. I., & Blaszczynski, A. (2014a). The prevalence and determinants of problem gambling in Australia: Assessing the impact of interactive gambling and new technologies. *Psychology of Addictive Behaviors: Journal of the Society of Psychologists in Addictive Behaviors*, *28*(3), 769–779.
- Gainsbury, S. M., Russell, A., Hing, N., Wood, R., Lubman, D. I., & Blaszczynski, A. (2014b). The prevalence and determinants of problem gambling in Australia: Assessing the impact of interactive gambling and new technologies. *Psychology of Addictive Behaviors: Journal of the Society of Psychologists in Addictive Behaviors*. <https://doi.org/10.1037/a0036207>
- Gainsbury, S. M., Russell, A. M. T., King, D. L., Delfabbro, P., & Hing, N. (2016). Migration from social casino games to gambling: Motivations and characteristics of gamers who gamble. *Computers in Human Behavior*, *63*, 59–67.
- Gainsbury, S. M., Wood, R., Russell, A., Hing, N., & Blaszczynski, A. (2012). A digital revolution: Comparison of demographic profiles, attitudes and gambling behavior of Internet and non-Internet gamblers. *Computers in Human Behavior*, *28*(4), 1388–1398.
- Gambino, B., & Shaffer, H. (1979). The concept of paradigm and the treatment of addiction. *Professional Psychology*, *10*(2), 207.
- Griffiths, M. (1999). Gambling Technologies: Prospects for Problem Gambling. *Journal of Gambling Studies / Co-Sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming*, *15*(3), 265–283.
- Griffiths, M. (2003). Internet Gambling: Issues, Concerns, and Recommendations. *Cyberpsychology & Behavior: The Impact of the Internet, Multimedia and Virtual Reality on Behavior and Society*, *6*(6), 557–568.
- Griffiths, M. (2005). Does gambling advertising contribute to problem gambling? *International Journal of Mental Health and Addiction*, *3*(2), 15–25.
- Griffiths, M., & Barnes, A. (2008). Internet Gambling: An Online Empirical Study Among Student Gamblers. *International Journal of Mental Health and Addiction*, *6*(2), 194–204.
- Griffiths, M., & Delfabbro, P. (2001). The Biopsychosocial Approach to Gambling: Contextual

- Factors in Research and Clinical Interventions. *Journal of Gambling Issues*, (5). Retrieved from <http://jgi.camh.net/index.php/jgi/article/view/3589/3549>
- Griffiths, M., Parke, A., Wood, R., & Parke, J. (2006). Internet Gambling: An overview of psychosocial impacts. *UNVL Gambling Research and Review Journal*, 10(1), 27–39.
- Griffiths, M., & Parke, J. (2002). The Social Impact of Internet Gambling. *Social Science Computer Review*, 20(3), 312–320.
- Griffiths, M., & Parke, J. (2010). Adolescent gambling on the internet: A review. *International Journal of Adolescent Medicine and Health*, 22(1), 59–75.
- Griffiths, M., & Wood, R. T. (2007). Adolescent internet gambling: Preliminary results of a national survey. *Education and Health*, 25(2), 23–27.
- Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods*, 18(1), 59–82.
- Gupta, R., & Derevensky, J. (1997). Familial and Social influences on juvenile gambling behavior. *Journal of Gambling Studies / Co-Sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming*, 13(3), 179–192.
- Hardoon, K. K., Derevensky, J. L., & Gupta, R. (2002). *An examination of the influence of familial, emotional, conduct, and cognitive problems, and hyperactivity upon youth risk-taking and adolescent gambling problems*. Montreal, Quebec: Ontario Problem Gambling Research Centre.
- Hollingshead, S. J., Kim, H. S., Wohl, M. J. A., & Derevensky, J. L. (2016). The Social Casino Gaming-Gambling Link: Motivation for Playing Social Casino Games Determines Whether Self-Reported Gambling Increases or Decreases Among Disordered Gamblers. *Journal of Gambling Issues*, 33, 52–67.
- 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/assets-uploaded/documents/Children%20and%20gambling%20-FINAL%20VERSION%20140709.pdf>
- Kim, H. S., Wohl, M. J. A., Salmon, M. M., Gupta, R., & Derevensky, J. (2015). Do Social Casino Gamers Migrate to Online Gambling? An Assessment of Migration Rate and Potential Predictors. *Journal of Gambling Studies / Co-Sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming*, 31(4), 1819–1831.
- King, D., Delfabbro, P., & Griffiths, M. (2010). The convergence of gambling and digital media: implications for gambling in young people. *Journal of Gambling Studies / Co-Sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and*

Commercial Gaming, 26(2), 175–187.

- 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 / Co-Sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming*, 26(2), 175–187.
- King, D. L., & Delfabbro, P. H. (2016a). Adolescents' perceptions of parental influences on commercial and simulated gambling activities. *International Gambling Studies*, 16(3), 424–441.
- King, D. L., & Delfabbro, P. H. (2016b). Early exposure to digital simulated gambling: A review and conceptual model. *Computers in Human Behavior*, 55, 198–206.
- King, D. L., Delfabbro, P. H., Kaptsis, D., & Zwaans, T. (2014a). Adolescent simulated gambling via digital and social media: An emerging problem. *Computers in Human Behavior*, 31, 305–313.
- King, D. L., Delfabbro, P. H., Kaptsis, D., & Zwaans, T. (2014b). Adolescent simulated gambling via digital and social media: An emerging problem. *Computers in Human Behavior*, 31(Supplement C), 305–313.
- King, D. L., Russell, A., Gainsbury, S., Delfabbro, P. H., & Hing, N. (2016). The cost of virtual wins: An examination of gambling-related risks in youth who spend money on social casino games. *Journal of Behavioral Addictions*, 5(3), 401–409.
- Ladd, G. T., & Petry, N. M. (2002). Disordered gambling among university-based medical and dental patients: A focus on Internet gambling. *Psychology of Addictive Behaviors: Journal of the Society of Psychologists in Addictive Behaviors*, 16(1), 76–79.
- Lambos, C., & Puglies, S. (2007). *Adolescent gambling in South Australia*. Adelaide, South Australia: Independent Gambling Authority of South Australia.
- Lipsman, A. (n.d.). The 2015 U.S. Mobile App Report. Retrieved October 10, 2017, from <http://www.comscore.com/Insights/Presentations-and-Whitepapers/2015/The-2015-US-Mobile-App-Report>
- Marshall, B., Cardon, P., Poddar, A., & Fontenot, R. (2013). Does Sample Size Matter in Qualitative Research?: A Review of Qualitative Interviews in is Research. *Journal of Computer Information Systems*, 54(1), 11–22.
- McBride, J., & Derevensky, J. L. (2009). Internet Gambling Behavior in a Sample of Online Gamblers. *International Journal of Mental Health and Addiction*, 7(1), 149–167.
- McMullan, J. L., & Kervin, M. (2012). Selling Internet Gambling: Advertising, New Media and the Content of Poker Promotion. *International Journal of Mental Health and Addiction*, 10(5), 622–645.

- Merlo, L. J., Stone, A. M., & Bibbey, A. (2013). Measuring Problematic Mobile Phone Use: Development and Preliminary Psychometric Properties of the PUMP Scale. *Journal of Addiction*, 2013, 912807.
- Messerlian, C., Byrne, A. M., & Derevensky, J. L. (2004). Gambling, youth and the internet: Should we be concerned? *The Canadian Child and Adolescent Psychiatry Review = La Revue Canadienne de Psychiatrie de L'enfant et de L'adolescent*, 13(1), 3–6.
- Monaghan, S. (2009). Responsible gambling strategies for Internet gambling: The theoretical and empirical base of using pop-up messages to encourage self-awareness. *Computers in Human Behavior*, 25(1), 202–207.
- Monaghan, S., Derevensky, J. L., & Sklar, A. (2008). Impact of gambling advertisements and marketing on children and adolescents: Policy recommendations to minimise harm. *Journal of Gambling Issues*, 22, 252–274.
- Morse, J. M. (2000). Determining Sample Size. *Qualitative Health Research*, 10(1), 3–5.
- Murphy, M. (2015, September 2). These are the most popular iOS apps and games of all time. *Quartz*. Retrieved from <https://qz.com/492870/these-are-the-most-popular-ios-apps-and-games-of-all-time/>
- Myrseth, H., Brunborg, G. S., & Eidem, M. (2010). Differences in Cognitive Distortions Between Pathological and Non-Pathological Gamblers with Preferences for Chance or Skill Games. *Journal of Gambling Studies / Co-Sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming*, 26(4), 561–569.
- Neal, P. N., Delfabbro, P. H., & O'Neil, M. G. (2005). Problem gambling and harm: Towards a national definition. Retrieved from <https://hekyll.services.adelaide.edu.au/dspace/handle/2440/40558>
- Parke, J., Wardle, H., Rigbye, J., & Parke, A. (2012). *Exploring Social Gambling: Scoping, Classification and Evidence Review*. Gambling Commission.
- Phillips, J. G., & Blaszczynski, A. (2010). *Gambling and the Impact of New and Emerging Technologies and Associated Products*. Port Melbourne: Gambling Research Australia.
- Poulin, C. (2000). Problem gambling among adolescent students in the Atlantic Provinces of Canada. *Journal of Gambling Studies / Co-Sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming*, 16(1), 53–78.
- Rachlin, H. (1990). Why do People Gamble and Keep Gambling despite Heavy Losses? *Psychological Science*, 1(5), 294–297.
- Sévigny, S., Cloutier, M., Pelletier, M.-F., & Ladouceur, R. (2005). Internet gambling: misleading payout rates during the “demo” period. *Computers in Human Behavior*, 21(1), 153–158.

- Smeaton, M., & Griffiths, M. (2004). Internet Gambling and Social Responsibility: An Exploratory Study. *Cyberpsychology & Behavior: The Impact of the Internet, Multimedia and Virtual Reality on Behavior and Society*, 7(1), 49–57.
- Splevins, K., Mireskandari, S., Clayton, K., & Blaszczynski, A. (2010). Prevalence of Adolescent Problem Gambling, Related Harms and Help-Seeking Behaviours Among an Australian Population. *Journal of Gambling Studies / Co-Sponsored by the National Council on Problem Gambling and Institute for the Study of Gambling and Commercial Gaming*, 26(2), 189–204.
- Thorne, H. B., Goodwin, B., Langham, E., Rockloff, M., & Rose, J. (2016). Preferred electronic gaming machine environments of recreational versus problem gamblers: An in-venue mixed methods study. *Journal of Gambling Issues*, 221–243.
- Thorne, H. B., Goodwin, B., Langham, E., Rockloff, M., & Rose, J. (2017). Preferred electronic gaming machine environments of recreational versus problem gamblers: An in-venue mixed methods study. *Journal of Gambling Issues*, 0(34). <https://doi.org/10.4309/jgi.v0i34.3965>
- Volberg, R. A., Gupta, R., Griffiths, M., Olason, D. T., & Delfabbro, P. (2010). An international perspective on youth gambling prevalence studies. *International Journal of Adolescent Medicine and Health*, 22(1), 3–38.
- Williams, R. J., & Wood, R. T. (2007). *Internet gambling: A comprehensive review and synthesis of the literature*. Ontario, Canada: Ontario Problem Gambling Research Centre.
- Winters, K. C., Stinchfield, R. D., Botzet, A., & Anderson, N. (2002). A prospective study of youth gambling behaviors. *Psychology of Addictive Behaviors*, 16(1), 3-9. doi:10.1037/0893-164X.16.1.3
- Wood, R. T., Williams, R. J., & Lawton, P. K. (2007). Why do internet gamblers prefer online versus land-based venues? Some preliminary findings and implications. *Journal of Gambling Issues*, 20, 235–252.

Appendix A: Scoping Questionnaire

MOBILE POKIE APPS AND GAMBLING BEHAVIOUR

Section 1: Demographics

Q1.1: What was your age in years on your last birthday?

{IF AGE NOT BETWEEN 18-29 SCREEN-OUT}

Q.1.1. In the last 6 months, how often did you gamble on Pokies?

1. Less than monthly
2. about monthly
3. 2 to 4 times a month
4. 2 to 3 times a week
5. 4 to 5 times a week
6. 6 or more times a week
7. I didn't gamble on Pokies within the last 6 months

Q.1.2. In the last 6 months, how often did you gamble on something OTHER THAN Pokies (such as Sports or Race Betting, Casino games, Poker, Bingo, Keno, etc.)?

[please don't include lottery or scratchies]

1. Less than monthly
2. about monthly
3. 2 to 4 times a month
4. 2 to 3 times a week
5. 4 to 5 times a week
6. 6 or more times a week
7. I didn't gamble on Non-pokie games or events within the last 6 months

[SCREEN-OUT: Q.1.1 =7 AND Q.1.2 = 7].

Q1.3: When was the last time you played a Pokie machine?

1. 1 month ago or less
2. More than one month ago

Q1.4: Please select your gender

1. Male
2. Female

Q1.5: Where were you born?

1. Australia
2. England
3. Scotland
4. Ireland
5. New Zealand
6. China
7. Japan
8. Germany
9. Greece
10. Italy
11. United States of America
12. Netherlands
13. Switzerland
14. Sweden
15. India
16. Malaysia
17. Philippines

18. Vietnam
19. South Africa
20. Other (please specify)

Q1.6: What is the highest degree or level of schooling you have completed? If currently enrolled, select the highest degree COMPLETED so far.

1. Doctoral or professional degree
2. Master's degree
3. Bachelor's degree
4. Associate's degree
5. Postsecondary non-degree award
6. Some college, no degree
7. High school diploma or equivalent
8. Less than high school

Q1.7: Are you currently?

1. Employed FULL TIME for wages
2. Employed PART TIME or CASUALLY for wages
3. Self-employed
4. Unemployed and looking for work
5. Unemployed but not currently looking for work
6. A homemaker
7. A student
8. Military
9. Retired
10. Unable to work

Q1.8: What is your marital status?

1. Single, never married
2. Married, de facto or domestic partnership
3. Widowed
4. Divorced
5. Separated

Q1.9: What is your approximate personal income level? Not including the income of a spouse, partner or family member (include income from all sources before taxes and any spending).

1. Negative/Nil income
2. \$1-\$199 weekly (\$1-\$10,399 per year)
3. \$200-\$299 weekly (\$10,400-\$15,599 per year)
4. \$300-\$399 weekly (\$15,600-\$20,799 per year)
5. \$400-\$599 weekly (\$20,800-\$31,199 per year)
6. \$600-\$799 weekly (\$31,200-\$41,599 per year)
7. \$800-\$999 weekly (\$41,600-\$51,999 per year)
8. \$1,000-\$1,249 weekly (\$52,000-\$64,999 per year)
9. \$1,250-\$1,499 weekly (\$65,000-\$77,999 per year)
10. \$1,500-\$1,999 weekly (\$78,000-\$103,999 per year)
11. \$2,000-\$2,499 weekly (\$104,000-\$129,999 per year)
12. \$2,500-\$2,999 weekly (\$130,000-\$155,999 per year)
13. \$3,000-\$3,499 weekly (\$156,000-\$181,999 per year)
14. \$3,500-\$3,999 weekly (\$182,000-\$207,999 per year)
15. \$4,000-\$4,999 weekly (\$208,000-\$259,999 per year)
16. \$5,000 or more weekly (\$260,000 or more per year)

Q1.10: What is your current residential postcode? _____ [Range: 0800 to 9999]

Section 2: Gambling in *your Teens*

For each statement below reflect on the time between the ages of 13 to 18 years old you were **MOST OFTEN** engaged in that activity, and then rate your frequency of play.

DURING THIS PERIOD, between the ages of 13 to 18 years old, I recall....

Q2.1: Playing Pokies for money

Q2.2: Gambling for money using other products such as card games, racing, sports betting, day trading, bingo, and casino games

Q2.3: Using games (any type) on my mobile phone

Q2.4: Using Pokie machine type games on my mobile phone

Response options for grid Q2.1 to Q2.4:

1. Every day
2. A few times a week
3. Once a week
4. A few times a month
5. Once a month
6. A few times a year
7. Once a year
8. Less than once a year
9. Never

Q2.5: Thinking back to my youth, I gambled for money prior to my 13th birthday:

1. Never
2. Once or twice
3. More than twice but less than a dozen occasions
4. On at least a dozen occasions (or more)

Section 3: Use of Wagering Products

Q3.1: How often did you gamble in the past 12 months?

Do not include lottery tickets, instant scratch tickets or raffles, but include ALL other types of gambling such as Pokies, Card games, Racing, Sports Betting, day trading, bingo and Casino games.

1. Monthly or less
2. 2 to 4 times a month
3. 2 to 3 times a week
4. 4 to 5 times a week
5. 6 or more times a week

Q3.2: How much time did you spend gambling on a typical day in which you gambled in the past 12 months?

1. Less than 30 minutes
2. More than 30 minutes but less than 1 hour
3. More than 1 hour but less than 2 hours
4. More than 2 hours but less than 3 hours
5. More than 3 hours

Q3.3: How often did you spend more than 2 hours gambling (on a single occasion) in the past 12 months?

1. Never
2. Less than monthly
3. Monthly
4. Weekly
5. Daily

The next 3 questions ask you to reflect on your gambling OVER THE LAST 7 DAYS, INCLUDING TODAY

Q3.4: How often did you gamble on a Pokie machine in the last 7 days?

1. I have not gambled on a Pokie machine at all in the past week

2. Once
3. Twice
4. 3 to 4 times
5. 5 to 6 times
6. Everyday

{IF ANSWER=1 SKIP TO Q4}

Q3.5: How much time did you spend gambling on a Pokie machine on a typical day in which you gambled in the last 7 days?

1. Less than 30 minutes
2. More than 30 minutes but less than 1 hour
3. More than 1 hour but less than 2 hours
4. More than 2 hours but less than 3 hours
5. More than 3 hours

Q3.6: How many times did you spend more than 2 hours gambling on a Pokie machine (on a single occasion) in the last 7 days?

[RANGE 0-28 TIMES]

Section 4: Play Behaviour

The next 9 questions ask you to reflect on your gambling over the last 12 months.

Q4: In the last 12 months:

1. Have you bet more than you could really afford to lose?
2. Still thinking about the last 12 month, have you needed to gamble with larger amounts of money to get the same feeling of excitement?
3. When you gambled, did you go back another day to try to win back the money you lost?
4. Have you borrowed money or sold anything to get money to gamble?
5. Have you felt that you might have a problem with gambling?
6. Has gambling caused you any health problems, including stress or anxiety?

7. Have people criticized your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true?
8. Has your gambling caused any financial problems for you or your household?
9. Have you felt guilty about the way you gamble or what happens when you gamble?

Response options:

1. Never
2. Sometimes
3. Most of the time
4. Almost always

Section 5: Play Intentions

Q5.1: Would you like to reduce the amount of MONEY you spend on gambling activities?

1. Yes
2. No

Q5.2: Would you like to reduce the amount of TIME you spend on gambling activities?

1. Yes
2. No

Q5.3: Are you actively trying to reduce your gambling activity?

1. Yes
2. No

Section 6: Player Experiences

What best describes your experience?

Q6.1: On casino games.

1. I've never played them or have only played them once or twice and don't know much about them
2. I have a go every so often for fun or on special occasions, but don't really know what I am doing

3. I know some of the basics on how to play and play casually from time to time for fun
4. I have a good understanding of the rules and play them regularly for enjoyment
5. I play them professionally to earn money

Q6.2: Pokie machines

1. I've never played them or have only played them once or twice and don't know much about them
2. I have a go every so often for fun or on special occasions, but don't really know what I am doing
3. I know some of the basics on how to play and play casually from time to time for fun
4. I have a good understanding of the functions of the games and play them regularly for enjoyment
5. I play them professionally to earn money

Q6.3: Sports betting

1. I've never bet them or have only bet once or twice and don't know much about them
2. I have a go every so often for fun or on special occasions, but don't really know what I am doing
3. I know some of the basics on how the system works and bet casually from time to time for fun
4. I have a good understanding of the how the system works and bet regularly for enjoyment
5. I bet professionally to earn money

Q6.4: If you had to class yourself in one of the three categories below, would you say you were a:

1. Casual gambler
2. Experienced gambler
3. Non-gambler

Section 7: Playing gambling-themed apps in your teens

Q7.1: Have you ever played a gambling themed app?

1. Yes

2. No

{IF ANSWER=2 SKIP TO Q8.1}

Q7.2: What age were you the first time you played a gambling themed app?

{IF AGE ≥19 SKIP TO Q8.1}

Q7.3: Between the ages of 13-18 at which age (or ages) do you think you played the most? Tick all that apply.

1. I only tried it once or twice
2. 13 years old
3. 14 years old
4. 15 years old
5. 16 years old
6. 17 years old
7. 18 years old

Q7.4: Who first introduced you to playing to gambling themed apps?

1. Parents
2. Siblings
3. Other relatives
4. Friends
5. Advertising
6. App stores or websites
7. Other (Please Specify)

Q7.5: When you were between the ages of 13 and 18 years old, who else do recall playing gambling themed apps in your household? Tick all that apply.

1. No one
2. Your Parents or legal guardians

3. Siblings
4. Other relatives that were not your legal guardians (e.g., aunts, uncles or grandparents living with you)
5. Other non-related household members

Q7.6: When did you last play a gambling themed app?

1. Today
2. In the last 3 days
3. In the last 7 days
4. In the last month
5. In the last six months
6. A year or more ago (please specify how many years ago)

{IF ANSWER=6 SKIP TO Q8.1}

Q7.7: How often have you played gambling themed apps in the last year?

1. Less than monthly
2. Monthly
3. Weekly
4. Daily or almost daily

Q7.8: How often have you played gambling themed apps in the last 7 days?

1. I have not played a gambling themed app at all in the past week
2. Once
3. Twice
4. 3 to 4 times
5. 5 to 6 times
6. Everyday

{IF ANSWER=1 SKIP TO Q8.1}

Q7.9: How many hours have you spent playing gambling themed apps in the last 7 days?

[RANGE 0-105 HOURS, allow for decimal places]

Section 8: Alcohol Consumption

For the next three questions, consider a “drink” to be a can or bottle of beer, a glass of wine, a wine cooler, or one cocktail or a shot of liquor (like rum, scotch, gin or vodka)

Q8.1: How often did you have a drink containing alcohol in the past year?

1. Never (0)
2. Monthly or less (1)
3. 2 to 4 times a month (2)
4. 2 to 3 times a week (3)
5. 4 to 5 times a week (4)
6. 6 or more times a week (4)

{IF ANSWER=1 SKIP TO Q9}

Q8.2: How many drinks did you have on a typical day when you were drinking in the past year?

1. ~~0 drinks (0)~~
2. 1 to 2 drinks (0)
3. 3 to 4 drinks (1)
4. 5 to 6 drinks (2)
5. 7 to 9 drinks (3)
6. 10 or more drinks (4)

Q8.3: How often did you have 6 or more drinks on one occasion in the past year?

1. Never (0)
2. Less than monthly (1)
3. Monthly (2)
4. Weekly (3)

5. Daily or almost daily (4)

Section 9: Mobile phone use

1. How frequently do you typically use the email function on your phone?
2. How frequently do you typically use the Internet feature of your phone?
3. How frequently do you use the games feature of your mobile phone?
4. How often do you talk on the phone while driving?
5. How often do you write text messages or emails while driving?
6. I sometimes think that I might be “addicted” to my cell phone
7. I use my cell phone more often than other people I know
8. Friends or family members have commented to me about my mobile phone use

Item responses range from 1= never to 6= constantly

Lucky Lolly Slots App Download and Login

Thank you for participating in the Mobile Pokie Apps and Gambling Behaviour study.

As a part of the study you will be invited to play our “Lucky Lolly Slots” Pokie-machine App once a week for 24 weeks for at least five minutes.

After leaving this page and claiming your rewards points, you can go ahead and download the “Lucky Lolly Slots” app to your smartphone or tablet from the Android or iOS (Apple) stores. If you can't find the app don't worry, you will receive an email soon with all the information you need. You will receive \$40 equivalent of reward points for downloading the app.



Then, once downloaded and opened, enter your *username, gender, and date of birth* on the ‘Let’s Get Started’ screen. For your privacy, and so we can link your survey answers to your game play, your unique username is provided below.

Username: <dummyID>

Write your username down prior to leaving this screen, so you can enter it when registering with the Lucky Lolly Slots app.

This password is case sensitive. You’ll likely need only to enter your Username once, although we recommend that you keep it on hand in case you need to download the App again for any reason, or log-out of the App during the course of the study (which is not recommended).

Please ensure you have sufficient data requirements, 50MB of space, on your phone or tablet to download the App. Data usage charges may apply when you are connected to a mobile network.

Survey Access Link:

<http://ssiweb.cqu.edu.au/html/mobilepokie/login.html>

One Click Link:

<http://ssiweb.cqu.edu.au/cgi-bin/ssiweb848/ciwwweb.pl?studynome=mobilepokie&id=VALUE>

Appendix B: Weekly Survey

A MOBILE POKIE APP AND GAMBLING BEHAVIOUR STUDY

WEEKLY SURVEY

Current app play (Treatment group version)

Q1.1: During the **last 7 days**, approximately how long have you spent playing **other** pokie style games on your smart phone or tablet (*do not include time spent playing 'Lucky Lolly Slots'*)?

Enter the weekly total in hours and minutes, e.g. 4 hours and 25 minutes.

_____ hours per week (0-147) _____ minutes per week (0-60)

Q1.2: During the **last 7 days**, approximately how long have you spent playing **non-pokie** style games on your smart phone or tablet?

Enter the weekly total in hours and minutes, e.g. 4 hours and 25 minutes.

_____ hours per week (0-147) _____ minutes per week (0-60)

Current app play (Control group version)

Q1.1: During the **last 7 days**, approximately how long have you spent playing pokie style games on your smart phone or tablet?

Enter the weekly total in hours and minutes, e.g. 4 hours and 25 minutes.

_____ hours per week (0-147) _____ minutes per week (0-60)

Q1.2: During the **last 7 days**, approximately how long have you spent playing other (non-pokie style) games on your smart phone or tablet?

Enter the weekly total in hours and minutes, e.g. 4 hours and 25 minutes.

_____ hours per week (0-147) _____ minutes per week (0-60)

(All participants)

Play Intention

Q2.1: Would you like to reduce the amount of time and/or money you spend on gambling activity?
Yes/No

Q2.2: Are you actively trying to reduce your gambling activity? Yes/No

Play Behaviour

Q3: During the **last 7 days**, approximately how long have you spent playing each of the following games (for money)?

NOTE: include any time you spent watching games or races that you bet money on.

Enter the weekly total in hours and minutes, e.g. 1 hour and 30 minutes.

- Pokies _____ hours per week (0-147) _____ minutes per week (0-60)
- Blackjack _____ hours per week (0-147) _____ minutes per week (0-60)
- Poker _____ hours per week (0-147) _____ minutes per week (0-60)
- Roulette _____ hours per week (0-147) _____ minutes per week (0-60)
- Keno _____ hours per week (0-147) _____ minutes per week (0-60)
- Craps _____ hours per week (0-147) _____ minutes per week (0-60)
- Horse Racing _____ hours per week (0-147) _____ minutes per week (0-60)
- Dog Racing _____ hours per week (0-147) _____ minutes per week (0-60)
- Bingo _____ hours per week (0-147) _____ minutes per week (0-60)
- Sport Betting _____ hours per week (0-147) _____ minutes per week (0-60)
- Day Trading _____ hours per week (0-147) _____ minutes per week (0-60)
- Other type of gambling _____ hours per week (0-147) _____ minutes per week (0-60)

Use of Pokie Machines

Q4.1: How often did you gamble on a Pokie machine in the **last 7 days**?

- a. I have NEVER gambled on a Pokie machine...OR, I have not gambled on a Pokie machine at all in the last 7 days [SKIP Qs 2 and 3]
- b. once
- c. twice
- d. 3 to 4 times
- e. 5 to 6 times

f. everyday

Q4.2: How much time did you spend gambling on a Pokie machine on a typical day in which you gambled in the **last 7 days**?

- a. less than 30 minutes
- b. more than 30 minutes but less than 1 hour
- c. more than 1 hour but less than 2 hours
- d. more than 2 hours but less than 3 hours
- e. more than 3 hours

Q4.3: How often did you spend more than 2 hours gambling on a Pokie machine (on a single occasion) in the **last 7 days**?

- a. Never
- b. Once
- c. 2-3 days
- d. 4-5 days
- e. Daily or almost daily

{FIRST WEEKLY SURVEY ONLY – ALL TREATMENT GROUP}

** treatment group only*

After the 24 weeks of the survey are complete, we would like to conduct telephone interviews with a small number of participants. This is to better understand their experiences with the Luck Lolly Slots app and gambling habits. Would you be willing to be contacted for a telephone interview?

Note: CQUniversity does not currently have your first name or telephone contact number, but it will be provided to us if and only if you agree.

Would it be OK to call you, in 24 weeks' time, to arrange an interview (less than 30 minutes with compensation of \$30 equivalent of points)?

[Yes, No]

Thanks for completing this part of the study!

{LAST WEEKLY SURVEY ONLY – FOR SELECT GROUP OF SSI SAMPLE PARTICIPANTS}

** treatment group only*

Throughout the study, we asked if they were willing to be contacted for a telephone interview so we could better understand your experiences with the Luck Lolly Slots app and your gambling habits.

Note: CQUniversity does not currently have your first name or telephone contact number, but it will be provided to us if and only if you agree.

Would it be OK to call to arrange an interview (less than 30 minutes with compensation of \$30 equivalent of points)?

[Yes, No]

Thanks for completing this part of the study!

{LAST WEEKLY SURVEY ONLY – FOR SELECT GROUP SPORTSBET SAMPLE PARTICIPANTS}

** treatment group only*

Throughout this study, we asked if participants were willing to be contacted for a telephone interview so we could better understand your experiences with the Luck Lolly Slots app and your gambling habits.

As we are now at the completion of the study we would like to begin arranging this. Would it be OK to call to arrange an interview (less than 30 minutes with compensation of \$30 equivalent of points)?

[Yes, No]

IF YES:

Could you please provide your first name and a telephone contact number below.

FIRST NAME:

TELEPHONE:

Thanks for completing this part of the study!

Appendix C: Qualitative Question Guide

Mobile EGMS | Qualitative Phase- Question Guide

During the interview we will discuss a number of different types of games. When we talk about:

- Pokie style apps - non-gambling games that simulate a pokie machine (i.e., lucky lolly slots used in the experiment)
- Other mobile gambling apps (e.g., roulette and poker simulations)
- Other mobile games – not about gambling such as world of tanks, candy crush etc.

Preliminary Questions

1. Can you tell me about your experiences of playing other mobile games which are not gambling-related, playing mobile apps that are not gambling related, when did you start playing them, what sort of games you like to play?

Prompts: Do you play these mobile games? If yes, how often.

What is it that you enjoy or dislike about these games?

Why do you play these games?

Do you play these games with other people?

Where do you play these games?

What prompts you to play them?

What makes you stop playing them or end a session?

Do you have a preference for gambling mobile games or non-gambling related gambling games? Why, why not?

What makes you play a non-gambling game over a gambling game and vice versa?

Do you ever worry about how much you play these games, whether it be gambling or non-gambling related games? Is there one mode that makes you more concerned?

2. And what was your experience with pokie style apps before your joined the study?

Prompts: Had you played these games before? If yes, how often? If no, why not?

If yes, what was appealing about these apps that made you want to try them? And how did you discover them?

Have you been playing these as long as other mobile games?

What was it that you enjoyed about these pokie-apps?

What didn't you like about them?

Did you play these pokie-apps with other people?

Where did you play them?

What would prompt you to play them?

What was your reasons for playing them?

What makes you stop playing them or end the session?

3. Can you tell me a bit about your experience playing the “Lucky Lolly Slots” app for the study?

Prompts: What did you like/dislike about it?

What prompted you to play it?

Where and when would you play it?

What did you like/dislike about it?

How did the game make you feel when you were playing it?

4. Can you describe any changes to your real-life pokie playing during the period in which you took part in our study?

Prompts: Why do you think these changes occurred?

What reasons can you think of that may have caused you to act differently?

5. Did you feel as though playing ‘Lucky Lolly Slots’ had an impact on your real-life pokie play?

Prompts: What do you think this impact was?

Why do you think this impact may have occurred? If not, why not?

Were you aware this was occurring at the time or was it something you became aware of after the fact?

What was it that made you aware a change was occurring?

6. And what about other pokie-apps during the period of the study? Do you think that these impacted your real-life pokie play?

Prompts: What do you think this impact was?

Why do you think this impact may have occurred? If not, why not?

Were you aware this was occurring at the time or was it something you became aware of after the fact?

What was it that made you aware a change was occurring?

7. Were there any events or issues you experienced during the period that you participated in the study that may have influenced your real-life pokie play?

Prompts: What were they?

How might they have impacted you real-life pokie play?

Were there any factors that made you want to gamble more or less?

Why might these have affected you gambling during the study?

Do you find these same things influenced your gambling prior to the study?

8. Is there anything else you would like to add about the study or your pokie-play that we haven't talked about yet?