RESEARCH REPORT

From adolescence to young adulthood: Associations between simulated and traditional gambling, and the role of parental factors

February 2022

responsiblegambling.vic.gov.au

Victorian Responsible Gambling Foundation

© Victorian Responsible Gambling Foundation, February 2022

This publication is licensed under a Creative Commons Attribution 3.0 Australia licence. The licence does not apply to any images, photographs, branding or logos.

This report has been peer reviewed by two independent researchers. For further information on the foundation's review process of research reports, please see responsiblegambling.vic.gov.au.

For information on the Victorian Responsible Gambling Foundation Research Program visit responsiblegambling.vic.gov.au.

Disclaimer

The opinions, findings and proposals contained in this report represent the views of the authors and do not necessarily represent the attitudes or opinions of the Victorian Responsible Gambling Foundation or the State of Victoria. No warranty is given as to the accuracy of the information. The Victorian Responsible Gambling Foundation specifically excludes any liability for any error or inaccuracy in, or omissions from, this document and any loss or damage that you or any other person may suffer.

Conflict of interest declaration

The authors declare no conflict of interest in relation to this report or project.

To cite this report

Russell, AProf Alex M T., Hing, Prof Nerilee, Newall, Dr Philip, Greer, Nancy, Dittman, Dr Cassandra K., 2022, From adolescence to young adulthood: Associations between simulated and traditional gambling, and the role of parental factors, Victorian Responsible Gambling Foundation, Melbourne.

Enquiries

Rosa Billi +61 3 9452 2625
rosa.billi@responsiblegambling.vic.gov.au

Victorian Responsible Gambling Foundation

Level 6, 14–20 Blackwood Street
North Melbourne
Victoria 3051

PO Box 2156
Royal Melbourne Hospital
Victoria 3050

Telephone: +61 3 9452 2600
Facsimile: +61 3 9452 2660
ABN: 72 253 301 291

Our vision: A Victoria free from gambling-related harm

Victorian Responsible Gambling Foundation

vicrgf
responsiblegambling
Victorian Responsible Gambling Foundation
ResponsibleGambling

From adolescence to young adulthood: Associations between simulated and traditional gambling, and the role of parental factors

Prepared by:
AProf Alex M T Russell
Prof Nerilee Hing
Dr Philip Newall
Nancy Greer
Dr Cassandra K. Dittman

Experimental Gambling Research Laboratory,
CQUniversity Australia

February 2022

Acknowledgements

This work was funded as part of Victorian Responsible Gambling Foundation Grants (Round 10 – Early Career Researcher). The authors wish to thank the Victorian Responsible Gambling Foundation. In particular, the authors thank Rosa Billi and Kate Scalzo for their patience and support during the COVID-19 pandemic. Thanks also to the Alannah and Madeline Foundation, especially Linda Barry and Ariana Kurzeme, for their support of the project. Two anonymous peer reviewers also provided very useful feedback that helped us to improve the final report, and we thank them.

The authors also thank the survey respondents for taking part in the study, and Veronica Smith and Mallory Colys at Qualtrics for assistance with recruitment. Thanks also to Professor Matthew Browne and Professor Matthew Rockloff for useful comments during survey analysis, to Hannah Thorne (aka Hannah Brajkovich) for assistance with editing the literature review and to Kristie-Lee Alfrey for assistance with survey programming. Finally, thanks to CQUniversity for in-kind contributions.

Table of contents

List of tables

List of figures

Executive summary

Objectives of the study

Simulated gambling products contain gambling-like components. Unlike gambling, money cannot be won, but some simulated gambling products provide opportunities to pay for in-game items and gameplay advantages. Examples include video games with gambling content, loot boxes, social casino games and demo or practice games on actual gambling websites. Some activities expose people to gambling and simulated gambling opportunities, such as playing esports games, watching esports events through online streaming services, entering into free fantasy sports competitions, and obtaining free loot boxes in video games. In this study, we consider these “exposure” and simulated forms separately. Recent research (Russell et al., 2020) has found that many of these exposure and simulated forms, especially those that are free to play, are popular amongst younger adults aged 18-24.

Because exposure and simulated gambling activities are not classified as gambling products, they are available to people under the age of 18. Concerns have been raised that potential early exposure to these products may be a gateway to traditional gambling (i.e., gambling forms where money can be staked, and won or lost depending on outcomes at least partly determined by chance). Note that we use the term “traditional” gambling to refer to forms that are classified as gambling, as distinct from simulated gambling, which are not. Traditional gambling in this context includes new forms, such as esports betting and skin gambling. Migration from simulated to traditional gambling forms has been suggested in previous studies, although much of this evidence is based on cross-sectional data, indicating that both simulated and traditional gambling appeal to the same people rather than indicating migration. There is limited longitudinal data showing migration from simulated to traditional gambling. The present study used an innovative retrospective methodology to examine sequences of engagement with exposure forms, simulated gambling and traditional gambling forms, to shed further light onto migration.

The study also aimed to examine predictors of taking part in traditional gambling, and risk and protective factors for experiencing problems due to traditional gambling. Key factors of interest were engagement in simulated gambling, as well as parental factors, because recent research (Hing et al., 2021) has found that parents are key facilitators of gambling amongst adolescents. People who grow up in a household with parents who gamble, or who approve of gambling, are more likely to gamble themselves, and more likely to experience problems with gambling. Similarly, parent-adolescent relationship style (e.g., hostility) has been associated with negative outcomes for young people, including mental health issues and, potentially, addictive behaviours (Diggs et al., 2017).

The study also sought to examine influences on both simulated and traditional gambling from parents, other family members and friends. These social influences can reflect learning behaviours from significant others, or may reflect socialising more with people who share interests, or both (Russell, Langham, & Hing, 2018). Simulated gambling games also include social features, which may serve as an important motivation for taking part.

Research questions

The three research questions for this project were:

1. Is playing games with gambling-related content associated with subsequent gambling behaviour and gambling-related harm, including at any point during adolescence and young adulthood?

2. Are certain types of parenting styles (e.g., hostile), or other parental factors (e.g., supervision, norms) related to adolescent games with gambling-like content, associated with greater (or lower) risk of subsequent gambling engagement and gambling-related harm?

3. What roles do gaming motivations and competing social influences (from peers and parents), have in engagement with games with gambling-like features during adolescence and subsequent gambling behaviour and gambling-related harm?

Methods

A total of 1,026 eligible respondents completed an online survey in late 2020. Respondents were aged 18-25, half from Victoria and half from the rest of Australia, with quotas to ensure approximately equal numbers of males and females. They were drawn from online panels, meaning that the sample is not representative. However, online panels tend to include higher rates of people experiencing problems due to their gambling, and this strengthens the analyses in this study. (For more on this point, please see Russell et al., 2021).

The survey asked about 12 traditional forms of gambling, including some newer forms such as betting on esports, or skins gambling. The survey also asked about four “exposure” forms (e.g., playing an esports video game, or opening a loot box earned during a game), and five simulated forms (e.g., buying a loot box, free or paid social casino games).

EXPOSURE FORMS	• Playing a video game which is also an esport • Watching an esports event (either online or in person) • Opening a loot box that you earned during a game • Entering into a free fantasy sports or daily fantasy sports competition
SIMULATED FORMS	• Playing video games, games with gambling components, like Grand Theft Auto's casino level • Buying a loot box with real money or via virtual currency that you purchased with real money • Playing gambling-like games (e.g., simulated pokies, poker, roulette) for free via an app or on social networking sites (social casino games) • Paying to play gambling-like games (e.g., simulated pokies, poker, roulette) via an app or on social networking sites (e.g., paying to play through in-game purchases) (social casino games) • Free demo or practice games on real gambling websites or apps, for example Mobile Casinos.
TRADITIONAL FORMS	• Buying lottery tickets • Buying instant scratch tickets • Playing the pokies • Betting on a sporting event • Betting on novelty events (like who will win a reality TV show or election) • Betting on a racing event • Playing bingo • Playing Keno • Playing casino table games • Betting on an esports event (a professional video game competition) • Entering into a paid fantasy sports or daily fantasy sports competition • Gambling using skins or skin deposits

Respondents were asked which forms they had taken part in during their lifetime. For each form that they had used, they were asked how old they were when they first took part, most recently took part, and most frequently took part. These responses allowed for determination of sequences of events.

Respondents also completed a range of measures to be used in the risk factor models, including:

- Demographics
- Psychological variables (impulsivity, psychological distress, comorbidities)
- Traditional gambling factors (urges, erroneous cognitions, motivations)
- Traditional gambling problems (last 12 months, lifetime)
- Traditional gambling harm (last 12 months)
- Traditional gambling norms from parents, family and friends
- Simulated gambling motivations
- Simulated gambling norms from parents, family and friends
- Simulated gambling parental supervision while growing up
- Gaming problems (last 12 months)
- Parent-Adolescent Relationship Scale (Burke et al., 2021)

We conducted two main types of analyses. The first examined how use of exposure and simulated forms relate to use of traditional forms. These analyses were based on the age at which respondents reported first taking part in each form, to determine possible sequences of engagement. The second set of analyses determined which factors predicted traditional gambling engagement and problems, within a risk and protective factor model that accounted for known factors, such as demographics and psychological variables. The aim was to determine whether engagement in simulated gambling predicted use of traditional gambling or traditional gambling problems over and above known risk factors. Further, it determined whether parental factors are unique predictors of engagement in traditional gambling and experience of gambling problems, over and above these known risk factors.

Results

Sequence of activities

The sequence analysis found that many of the exposure forms (especially playing esports video games and free loot boxes) were often first used by those under 18, as were some of the simulated forms (playing video games with gambling content, playing free social casino games, buying loot boxes). This was expected, because these activities are not restricted for those who are under 18. For traditional gambling forms, most people first

took part as soon as they turned 18, although scratch cards and bingo had some uptake before the age of 18.

When examining which forms came first, the exposure and simulated forms that were often first used by those under the age of 18 were more likely to be used before any traditional forms of gambling. However, lotteries, scratch tickets and bingo were commonly used before the other exposure and simulated forms that are less likely to be first used by those under the age of 18 (e.g., free or paid social casino games, demo or practice games on gambling operators' websites). Notably, these forms, especially social casino games, are ones where the core gameplay is about taking part in a gambling-like activity, which contrasts with other forms, like playing video games that include gambling content, where the simulated gambling is more incidental.

The analyses above consider each exposure or simulated form against each traditional form. Subsequent analyses examined participation in any traditional form of gambling. A number of outcomes were considered, including taking part in traditional gambling during the lifetime, or the last 12 months, and experiencing problems, both during the lifetime or during the last 12 months. All exposure or simulated forms were associated with all, or most, of these outcomes, depending on the exact exposure or simulated form in question. Notably, the simulated forms that tended to be taken up after traditional forms (free or paid social casino games, demo games) had the strongest associations with traditional gambling.

Risk factor models

Because numerous factors were considered, these models were conducted over a few separate analyses. First, parental factors were examined in relation to simulated gambling engagement and gaming problems. While these analyses assess risk factors, they do not assess causation, and these findings should be interpreted as correlations, not causes. Parent-adolescent hostility and parental norms for both simulated and traditional forms of gambling were associated with engagement in simulated gambling, and with gaming problems. Parental restrictions on gaming when growing up was also associated with gaming problems. Parent-adolescent hostility and parental norms for both simulated and traditional gambling were also associated with traditional gambling engagement and gambling problems, both during the lifetime and the last 12 months.

Next, norms from parents, family and friends, as well as gaming motivations (enhancement, social, coping, self-gratification) were examined in relation to simulated gambling engagement and gaming problems. The same factors were also examined in relation to traditional gambling engagement and problems. In terms of parental factors, hostility and norms for both simulated and traditional gambling were associated with both simulated and traditional gambling outcomes, including engagement and gaming and gambling problems.

Then, norms from people other than parents (friends, other family members) and gaming motivations were also analysed. All norms and all gaming motivations were associated with simulated and traditional gambling engagement, and gaming and gambling problems.

All of the above analyses were bivariate analyses, and did not control for other variables. We therefore conducted a multivariate model, to control for known risk factors. We split the risk factors into distal factors (those that do not have a direct effect on gambling

engagement or problems, such as demographics) and proximal factors (those that are more closely associated with gambling engagement or problems, such as urges or erroneous cognitions). This is because, when included in the same model, proximal factors tend to obscure the effects of distal factors. The aim of these analyses was to determine if simulated gambling engagement, parental factors, and gaming motivations uniquely predict traditional gambling engagement or problems.

When controlling for known risk factors, simulated gambling norms from parents were still associated with traditional gambling engagement and problems, but parent-adolescent hostility was only associated with level of traditional gambling engagement (i.e., taking part in more traditional gambling forms). Simulated gambling engagement predicted traditional gambling engagement and problems over and above known risk factors. Gaming motivations and gaming disorder predicted lifetime traditional gambling problems.

Discussion

RQ 1: Is playing games with gambling-related content associated with subsequent gambling behaviour and gambling-related harm, including at any point during adolescence and young adulthood?

Respondents were more likely to engage in the exposure forms of playing esports video games and opening free loot boxes, and the simulated forms of playing video games with gambling components, before the age of 18. Most who engaged in traditional forms waited until they were 18, but tended to take part as soon as they turned 18.

Respondents were most likely to first take part in playing esports video games, opening free loot boxes and playing video games with gambling components before most traditional gambling forms. However, some of the less harmful traditional gambling forms (lottery tickets, scratch tickets, bingo) tended to occur before some of the exposure and simulated forms. Notably, the simulated forms that very closely emulate gambling (social casino games and demo games) were more likely to occur after engagement in traditional gambling forms, suggesting that people may first gain an interest in gambling, and then take part in these simulated gambling forms as a free or lower cost alternative. That is, migration between exposure or simulated forms and traditional forms appears to depend on the forms in question.

An alternative interpretation is that many of these simulated and traditional forms appeal to the same kinds of people. For example, people who play EGMs/pokies may also have an interest in taking part in social casino games. However, simulated gambling may also explain something unique in traditional gambling engagement, because simulated gambling engagement was a unique predictor in the risk factor models. These models also found links between simulated gambling engagement and traditional gambling problems. This indicates that, not only do simulated and traditional forms appeal to the same kinds of people, but that users of these products are more likely to experience gambling problems, compared to people who do not engage in simulated gambling.

RQ 2: Is the quality of the parent-adolescent relationship (e.g., hostile, connected), or other parental factors (e.g., supervision, norms) related to adolescent use of games with gambling-like content, associated with greater (or lower) risk of subsequent gambling engagement and gambling-related harm?

Three parent-adolescent relationship variables were considered: connectedness, involvement and hostility. Hostility refers to negativity, criticism or conflict, and was associated with most outcomes. Hostile parent-adolescent relationship predicted taking part in both simulated and traditional gambling forms, potentially because these forms commonly serve as an escape. Further, hostility was associated with gaming problems and traditional gambling problems. While hostility did not remain significant with controlling for other known factors, it was associated with psychological distress and parental injunctive norms, both of which remained significant in the models. Hostility therefore appears to be an important predictor, but the nature of its relationship with simulated and traditional gambling should be explored further. It is important to note that these results are not necessarily causal. For example, if an adolescent gambles, in some cases this may create hostility in the relationship with their parents or guardians.

Parental restriction of gaming when growing up was associated with gambling problems, but the direction of this relationship is unclear. The most likely interpretation is that, if an adolescent is experiencing gaming problems, a parent might restrict access in attempting to reduce problems. This also requires further study.

Parental norms were key risk factors. We considered two types of norms for both simulated and traditional gambling: whether parents were perceived to approve of taking part in the activity (injunctive norms), and whether parents were perceived to take part in the activity themselves (descriptive norms). All were highly correlated with each other; parents who were perceived to approve of simulated gambling were more likely to be perceived to approve of traditional gambling, and to be perceived to be taking part in both. All parental norms were also associated with the respondents' engagement in both simulated and traditional gambling, and gaming and gambling problems. The role of parents is a key risk factor for gambling and simulated gambling amongst young people, as seen in this study and other recent studies (Hing et al., 2021).

RQ 3: What roles do gaming motivations and competing social influences (from peers and parents), play in engagement with games with gambling-like features during adolescence and subsequent gambling behaviour and gambling-related harm?

Four motivations for gaming were considered: social, coping (escape), enhancement, and self-gratification. All motivations were associated with higher levels of simulated gambling behaviour and a higher risk of gaming harm. All motivations were also associated with traditional gambling engagement and problems. However, all motivations were highly correlated with each other, meaning that it is difficult to draw different conclusions about the different motivations. A more general conclusion is that people who are more motivated to take part in simulated gambling are more likely to take part in traditional gambling, and to experience gambling problems.

We expected to see competing motivations from parents and friends, such as friends wanting to engage in simulated gambling with the respondents, but parents wanting to restrict use of simulated gambling. Instead, we found that norms from parents and friends (as well as other family members) were all highly correlated, so people who had parents who approved or took part in simulated gambling were also more likely to have friends who did so. This aligns with recent work showing that gambling influences tend to come from multiple actors in an individual's social network rather than just some of them, especially amongst those experiencing problems (Russell, Langham, & Hing, 2018).

Implications

Migration between simulated gambling and traditional gambling has been suggested in previous research. Our findings indicate that migration may depend on the forms in question. Notably, engagement in simulated forms that most closely resemble gambling (social casino games and demo games) was most likely to occur after engagement in traditional gambling forms. Future studies of migration might consider these findings in their design and interpretation, since our results suggest that disaggregating simulated gambling into discrete activities that vary in terms of their resemblance to gambling and pay-to-play options may yield valuable insights. However, migration may not be the only potential problem with simulated gambling. A simulated pokie, for example, is not bound by the same payout requirements as a real pokie, and may give people a false sense of confidence in the possibility of winning money in real gambling forms. Further, paid simulated gambling forms generally do not have caps on how much can be paid, allowing people to spend more than they intend, just like gambling products.

Parents play a key role, both in terms of the nature of their relationship with their children, and their normative attitudes and behaviours with gambling and simulated gambling products. A consistent finding is that people exposed to gambling via their parents while growing up are more likely to gamble themselves. Further, parents appear to be the biggest facilitators of underage gambling (Hing et al., 2021), and underage gambling is consistently linked to gambling problems (Russell et al., 2020). Education programs for parents may help them understand more about how their actions can influence their children. Further, education can help parents understand the risks associated with gambling and simulated gambling, so that they can educate their children.

Parents are not the only influence on a person's behaviour. Social influences have been observed in a range of behaviours, including traditional gambling and, in this study, simulated gambling. Many simulated gambling forms offer incentives to sign up friends, meaning that simulated gambling can spread through social connections and become a part of a group's social activities (Russell, Langham, & Hing, 2018). Further, being part of a group that engages in these activities, and even doing well in games with simulated gambling, can imbue social status. These games occur online, and recent evidence has found that association with an online community has been associated with gaming problems (Hing et al., 2021). Once an activity becomes a part of a social group, and a person's network more broadly, it can be difficult to reduce these activities, making it harder to avoid problems that may emerge.

There are implications for game developers. The first arises from the way in which these games are monetised, where people can commence playing for free, but then pay to continue playing with no expenditure cap. This practice appears to rely on a small number of high-paying customers, many of whom may be experiencing gaming problems (Close et

al., 2021). This is similar to gambling operators who gain a large proportion of their income from a small proportion of high-intensity players (Fiedler et al., 2019). Limit-setting and self-exclusion tools exist for gambling products, and could be introduced for simulated gambling products. Operators could also take other cues from recent gambling changes, such as ensuring that their marketing is responsible, that they do not target vulnerable people, and that they provide links to help services.

Regulators could consider closer inspection of some simulated gambling forms, especially social casino games, loot boxes and demo games. Loot boxes are not regulated as gambling in Australia, but at least some loot boxes appear to meet the criteria for gambling; staking something of value, the outcome is determined by chance, and there is a chance to win something of value since some winnings (e.g., skins) can be sold or used as currency. Regulators, who could draw on the National Consumer Protection Framework for Online Wagering to identify measures that could also be incorporated into simulated gambling. Regulators could also consider simulated gambling elements when determining the age rating for a particular video game. At present, most exposure or simulated forms are not restricted, but age restrictions do exist, such as MA15+ and R18+ that may be appropriate for simulated gambling products.

Limitations

The sample was drawn from an online panel and is therefore not representative. However, the sample included a high proportion of people experiencing gaming or gambling problems, allowing them to be studied in detail, which is a strength of the study. Small sub-samples of these groups of interest are often a key limitation of prevalence studies. The study relied on self-report data and may be subject to recall bias, especially the questions about the age of uptake of each activity. However, the exact age was not necessarily required, because the analysis instead was based around relative ages, with biases likely to be similar across forms. It is possible that respondents did not wish to report taking part in traditional gambling activities before the age of 18, because it is illegal. However, respondents were reminded at this point in the survey that their answers were anonymous, to attempt to minimise social desirability bias. Finally, our methodologies do not allow us to infer causation, despite demonstrating temporal sequences. Prospective longitudinal studies are required to confirm the present results, but even a prospective longitudinal study cannot show causation. Experimental methods are required, but this may not be possible because it would require randomly allocating some people to take part in these forms of gambling and simulated gambling, and others not to do so, which may not be practical or ethical.

Conclusions

This study found that “exposure forms” (e.g., watching esports, playing esports video games) and simulated gambling forms (e.g., free or paid social casino games and demo games) were associated with traditional gambling engagement, gambling problems and harm. However, the study’s findings conflict with previous findings of migration from simulated to traditional gambling because the simulated gambling forms that most closely resemble gambling (social casino games, demo games) were more likely to first occur after traditional gambling. Simulated and traditional gambling forms appear to appeal to the same people, including those who are more likely to experience gambling problems. It

is important to monitor and regulate simulated gambling, since engagement is associated with gaming problems, and because there are potentially problematic aspects, such as the ability to spend unlimited money in the game.

Parents are a key influence on engagement with both simulated and traditional gambling activities, and experiencing gaming and gambling problems. The nature of the parent-adolescent relationship was one important factor, where relationships that include conflict or are otherwise hostile are associated with engagement and problems. Further, parental norms, both through the perception of their approval of gambling, and their own engagement with gambling, are key influences. So too are influences from friends and other family members.

Background

Simulated gambling refers to a range of activities that share similar characteristics to traditional gambling forms, but are not classified as gambling, in part because money or something else of value cannot be won. Examples include loot boxes in video games (which are classified as gambling in some countries, but not in Australia), social casino games, and demo or practice games on real gambling websites. One further category is video games that include gambling components, but where gambling is not the primary function of the game. It has been suggested that these games may act as “gateway drugs” to traditional forms of gambling (Kim et al., 2017; King et al., 2016), especially because these forms are readily available to people under the age of 18. Parental factors are also an important issue for this group, since recent work has found that parents play a key role in facilitating underage gambling and the use of simulated gambling products (Hing et al., 2021; Riley et al., 2021). Further, people may take part in simulated gambling due to social influences from others, especially friends, and for a variety of motivations. The present research set out to explore whether there is a migration pathway from simulated gambling to traditional gambling forms; what role parents play (either through their own behaviour, approval, or the nature of the parental-adolescent relationship); and the roles of social influences, and motivations for gaming. Importantly, the present study uses innovative methods to explore not just engagement with simulated and traditional gambling forms amongst emerging adults (aged 18-25), but also their use during adolescence, to allow examination of possible sequences of engagement with simulated and traditional gambling, to shine light on possible pathways by establishing which forms were used first.

This study recognises that gambling, simulated gambling, and gaming are popular and legal activities for young adults, and that engagement in these activities can have social, emotional, cognitive and health benefits for participants (Granic et al., 2014; Gray, 2015; Griffiths, 2019; Griffiths et al., 2016; Rockloff et al., 2019). However, engagement in these activities can also result in harm to young people across several life domains. Several factors increase this risk of harm, as discussed in this chapter.

The changing landscape of gaming and gambling and youth exposure

Gambling can be defined as the staking of something of value on an outcome which is at least partly determined by chance to win something of value (Neal et al., 2005). Traditional gambling products include casino games, electronic gaming machines (EGMs), sports betting, race betting, and lottery products. Additionally, new forms of gambling, including fantasy sports betting (gambling based on fantasy combinations of real sports players) and esports betting (betting on professional video game contests, “esports”), are particularly appealing to adolescents (Macey & Hamari, 2019), and are currently regulated as gambling products in Australia. In the context of this report, we also refer to these newer products as forms of traditional gambling, in the sense that they are similar to other traditional forms in that money (or something of value) can be staked, and won or lost, depending on an outcome at least partly determined by chance. This also distinguishes them from simulated gambling forms, where money cannot be won.

New products have emerged that look and feel like gambling but do not meet formal criteria (e.g., social casino games) (King et al., 2016), or that appear to meet definitions of gambling but are not currently regulated as such in Victoria, such as video game loot boxes (Drummond & Sauer, 2018; Drummond et al., 2020; King, 2018). Because these newer forms are not classified as gambling products, and are not otherwise regulated or restricted, they are readily available to people under the age of 18.

Gambling-like content in video games is especially relevant given that adolescent video game-playing is almost ubiquitous in Australia, particularly amongst males (up to 96%) (Lawrence et al., 2015). In fact, some of the most popular games include gambling-like elements, e.g., Counter-Strike: Global Offensive (CS:GO) (eSafety Commissioner, 2018). However, as identified by King (2018), other types of games feature gambling-like content. King's (2018) taxonomy of gambling-like products includes: simulated non-financial gambling, monetised simulated gambling, monetised video gaming, unregulated online gambling, daily fantasy sports, and esports gambling. These types of games and their relevance to young people are discussed below.

Simulated non-financial gambling

Simulated non-financial gambling in the digital age consists of products that look and feel like gambling but that do not require money to play. Examples of simulated non-financial gambling are smartphone poker apps (e.g., Zynga Poker) (King, 2018)—some of which are "clearly directed towards young, digital-savvy users" (Albarrán Torres & Goggin, 2014)— and EGM or 'pokies' apps (e.g. Big Fish Casino). As described below, these social casino games may also include payment, but can also be played for free with some limits. Another category of simulated non-financial gambling is that of practice or demo games. These are gambling-type games that are included on real gambling websites, but can be played for free, ostensibly so that players can learn how to play without putting money at risk. Gainsbury et al. (2015) defined these as, "games that replicate gambling activities that are provided by a gambling operator for play without requiring any money" (p. 251).

These games often do not have the same required return to player as real gambling products. For example, in order to increase the excitement of these products, EGM apps often pay out a lot more frequently than a slot machine would do in a pub or club. There are concerns that this unrealistic return to player gives users a false impression of their potential winnings from traditional monetised gambling (Frahn, Delfabbro & King, 2015; King et al., 2010; Sévigny, Cloutier, Pelletier & Ladouceur, 2005). Indeed, research indicates that there is an association between early engagement in EGM games and later gambling behaviour. A longitudinal study found that young adults aged 18-29 years who played practice EGM games one week were more likely to gamble on real EGMs the following week (Rockloff, Browne, Greer, et al., 2020). Retrospective reports also showed that playing practice EGM games was associated with gambling problems. Additionally, those who reported playing practice EGM games prior to the age of 13 also reported gambling frequently for money before the age of 13. Data from 2018 found that around one in four boys aged 16-17 reported playing gambling-like games in the last 12 months, compared to one in seven girls (Warren & Yu, 2019).

Monetised simulated gambling

While simulated non-financial gambling is free-to-play, monetised simulated gambling refers to games where money can be spent (e.g., to buy in-game credits for additional play), but money cannot be withdrawn. Monetised simulated gambling may begin when a player has run out of credits on a non-financial simulated gambling game, and wishes to continue playing. While some social casino games can be considered simulated non-financial gambling, others allow the player to pay to unlock new features or continue gameplay after a certain amount of free credits have expired. The games simulate popular forms of gambling, such as EGMs and scratch tickets, and therefore look and feel like gambling, but any winnings in the game cannot be withdrawn with real money payouts (Gainsbury, King, et al., 2015). As mentioned above, simulated gambling is likely to be predictive of real money gambling (Rockloff, Browne, Greer, et al., 2020). This effect may be magnified in monetised simulated gambling because real money can be involved. An Australian study comparing people who played free social casino games to those who paid for social casino games found that players who pay are more likely to be male, younger, speak a language other than English at home, and have a university education (Gainsbury, King, et al., 2016). Paying players played more frequently, and were more likely to play for social interaction, compared to players who used free social casino games. However, there is currently little evidence comparing non-financial and monetised simulated gambling forms in terms of which have stronger links with traditional gambling.

Monetised video gaming and unregulated online gambling

In-game purchases are now common in video games. Some in-game purchases offer direct purchase of in-game goods, and these are not generally considered to constitute gambling. However, paid loot boxes do have conceptual similarities with gambling (Samarnggoon & Kunkhet, 2019). Loot boxes are like ‘lucky dip’ prize boxes where the player does not know the contents of the box (Rockloff et al., 2021). The contents of loot boxes are therefore at least partly determined by chance. Some loot boxes can be earned via gameplay and do not involve any economic cost to the player. Thus, such loot boxes do not involve the staking of something of value (Neal et al., 2005). In contrast, paid loot boxes are purchased with real money (King, 2018), and so meet the main criteria for gambling (Neal et al., 2005). However, it has been argued that since loot boxes always provide the player with something, there is in effect no way of losing from a loot box. However, an analysis of transactions on video game trading exchanges suggests that most loot box items have market values below the average cost of a loot box, therefore yielding effective monetary losses (Drummond et al., 2020). Some loot box items provide competitive advantages (e.g., better weapons) while others are purely cosmetic. “Skins” are an example of a purely cosmetic item and are common in games such as OverWatch and CounterStrike Global Offensive. Skins are a downloadable graphic that changes the appearance of an in-game item, such as by changing the colour scheme of a player’s weapon. Skins can either be bought directly with real money, or won in loot boxes. These loot boxes can be earned for free during gameplay, or bought with real currency, or both, depending on the game (Hamari et al., 2017). Some skins are even rare and highly-valued enough to be worth many thousands of dollars (Kotwani, 2021). In fact, in 2016 the skins market was estimated to be worth in excess of $4.8 billion (Greer et al., 2019; Grove, 2016).

Until recently, items won within loot boxes were not considered items of value because they could not be sold to other players, or used as currency outside the game. However, for certain games, skins can be sold outside the game, or even used directly as a

gambling currency amongst certain online operators (e.g., Gamdom, CSGOFast or CSGOEmpire; all operating as of August 2021). Accordingly, players can put money into the game, stake this money on a game of chance (loot boxes), and the resulting items (skins) can be sold to others or used as currency, including for gambling (Wardle, 2019). Thus, these games meet the definition of gambling (Neal et al., 2005). Some jurisdictions have banned loot boxes (e.g., Belgium, Netherlands) (King & Delfabbro, 2019). In Australia, a Federal Parliamentary Committee recently called for a comprehensive review into the regulation of loot boxes in video games as gambling products (Environment and Communications References Committee, Australian Senate, 2018). One line of argument for regulating loot boxes as gambling is that people experiencing problem gambling tend to also spend disproportionate amounts of money on loot boxes (Zendle & Cairns, 2018), strengthening evidence that loot boxes are 'psychologically' akin' to gambling (Drummond & Sauer, 2018).

Skins can also be used as currency for betting on some websites that are external to the video game developer's, in order to either win more skins or actual money (Hardenstein, 2017). The use of these in-game items for this type of gambling cannot legally be provided by Australian gambling operators, but offshore websites that offer these services are often poorly regulated (King, 2018). Due to the lax age controls of many of these offshore sites, it is not difficult for adolescents to access skin betting products (Greer et al., 2019). As a result of the emerging nature of this gambling mode and that these sites are often based out of the jurisdiction of study, there is limited data on who gambles on loot boxes and with skins. However, research from the UK reports that between 3% and 11% of adolescents have engaged in skin gambling (Gambling Commission, 2017; Parent Zone, 2018). In NSW Australia, 36.5% of adolescents had purchased loot boxes; and 14.5% reported gambling with skins in the past-year – 7.9% to bet privately with friends, 6.2% to bet on esports, 5.8% to bet on another site ('skin betting'), and 4.8% to bet on the outcome of other competitive events (Hing et al., 2021).

Esports gambling, fantasy sports, daily fantasy sports

Two emerging forms of gambling, esports gambling and daily fantasy sports betting, are also likely to appeal to adolescents. Playing and mastering video games takes skill, and this has led to the professionalisation of video game competitions, known as esports (Bányai et al., 2018). Esports are streamed via social media with commentary, and can also be watched live in a stadium, similar to traditional sporting contests (Bányai et al., 2018). Betting on esports can occur with real currency, virtual goods such as skins, or cryptocurrency (Gainsbury et al., 2017). Esports betting typically appeals to young, often underage, males (Greer et al., 2021; Macey & Hamari, 2019). Some of the most recent figures from Australia, in 2018, showed that males aged 14-34 were the most engaged esports spectators, and the most common access point was via online streaming through YouTube (Australian Communications and Media Authority, 2019). Amongst 8-17 year olds in Australia in 2018, 47% had played an esports video game, with 8% competing in an esports tournament (eSafety Commissioner, 2018). Like professional sporting events, gambling markets exist for esports games and tournaments. Recent Australian prevalence studies show that cash betting on esports is quite uncommon – around 0.5% of the adult population take part – but is most common amongst younger males (Browne, Rockloff, et al., 2019; Rockloff, Browne, Hing, et al., 2020). Esports cash betting is also of low prevalence amongst underage people in Australia, with a recent study of youth gambling in NSW finding that only 8 out of 551 respondents (1.5%) in a weighted representative

sample of 12-17 year olds had bet on esports in the last 12 months (Hing et al., 2021). However, 6.2% had bet on esports with skins.

Fantasy sports involves assembling a make-believe sports team consisting of real players within a particular sport, even though the players may play for different teams in real life. Fantasy sports often involve paying to play, and some sites are regulated in Australia (Australian Communications and Media Authority, 2021), although some offshore competitions may be unregulated (Greene, 2015; Meehan, 2015). Points are earned for the team based on each player's statistics in real world sporting contests. The players with the most points then share a prize pool constituted from the entry fees, similar to how money is allocated in a poker tournament. Normally, fantasy sports occur over a long time period, such as a sporting season. However, daily fantasy sports are an accelerated version, taking typically a week or even a single day (Rose, 2015). Like esports, daily fantasy sports appeal to younger people, and playing daily fantasy sports was the strongest predictor of being at-risk of gambling problems amongst a sample of 13-15 year old American adolescents (Marchica & Derevensky, 2016; Marchica et al., 2017). Only 1.3% of adolescents in NSW reported gambling on fantasy sports in the past year (Hing et al., 2021).

Underage exposure to novel gambling-like and gambling products

Young age is a consistent risk factor for gambling-related harm (Gainsbury, Russell, Wood, et al., 2015; Hing, Russell, Vitartas, et al., 2016; Johansson et al., 2009; Riley et al., 2021; Russell, Hing, Li, et al., 2019), including amongst both males and females aged 18-24 years in Victoria (Hing, Russell, Tolchard, et al., 2016). Australians aged 18-29 account for approximately 11.9% of regular gamblers, but 27.4% of people classified as 'problem gamblers' (Australian Institute of Family Studies, 2016). Thus, young adulthood is a particularly vulnerable time for Australians to experience gambling-related harm. These high rates of gambling problems soon after reaching legal gambling age suggest that formative influences, particularly during adolescence, may contribute to this vulnerability.

Recent studies have noted that gambling is becoming normalised among adolescents (Responsible Gambling Strategy Board, 2018), including in Australia. Frequent gambling advertising contributes to this normalisation (Hing et al., 2018; Thomas et al., 2016), often occurring during live and televised sporting contests (Hing et al., 2014; Pitt et al., 2017a). This exposure to gambling content extends to online spaces, such as social media (Gainsbury, King, et al., 2015) and various forms of video games and related products. Social media is popular amongst Australian adolescents. Facebook alone was used by approximately 75% of 13-17-year-old adolescents in the 12 months to June 2017, and games with gambling-like features are available on the Facebook platform (eSafety Commissioner, 2018). A study by Jacques and colleagues (2016) found that 54% of the 100 most popular games on Facebook involve simulated gambling content and do not have age restrictions.

Gambling-like content is also available in video games, such as those played on consoles, PCs, or portable devices including smartphones. Major surveys in Australia (Rockloff, Russell, Greer, et al., 2020) and the UK (Zendle et al., 2020), have found that around half of the most popular current video games contain paid loot boxes. Video games are popular amongst youth and readily available to them, being found in around 97% of Australian

homes with children (Brand et al., 2017). A large proportion of young people engage in video games (11-15 year olds: 96.3% of males, 81% of females; 16-17 year olds: 90.6% males, 62.4% females) (Lawrence et al., 2015). Research indicates that adolescent engagement in video games with gambling-like content is lower: approximately 10-23% for social casino games (Gainsbury, King, et al., 2015; King et al., 2014) and around 11% for skins betting (UK Gambling Commission, 2018). In NSW Australia, 31.7% of adolescents reported playing video games with 'mini' gambling components in the past year, and 14.2% played gambling-themed apps, 14.2% played free demo games, and 11.8% played gambling-style games on social networking sites (Hing et al., 2021).

Many of these simulated forms are more attractive to younger people, compared to traditional forms. A recent study in NSW (Russell et al., 2020) found that emerging adults aged 18-24 years were more likely to take part in playing games with gambling content and buying loot boxes compared to those aged 25-29 years, but less likely to take part in established gambling forms (such as EGMs or sports betting), as well as newer gambling forms (such as betting on esports or fantasy sports). These results suggest a generational change in engagement with simulated and traditional gambling forms.

Moreover, awareness of these forms of games with gambling-like content is high amongst youth, with 45% of UK 11–16-year-old adolescents aware that it is possible to bet with skins (UK Gambling Commission, 2018). Furthermore, many of the most popular video games played by young people (e.g., CS:GO, FIFA) include loot boxes. Thus, adolescent exposure to, and engagement with, gaming products with gambling-like elements is common in cyber places that are popular with young people. Therefore, adolescent exposure to gambling content through these channels is high, and may further normalise gambling, similar to the established relationship with gambling advertising (Hing et al., 2018; Thomas et al., 2016). In addition to potentially causing harm through encouraging adult gambling, some games may result in adolescent gambling, and therefore may be intrinsically risky for adolescents.

Skins gambling, esports betting and daily fantasy sports betting are novel gambling products that may particularly appeal to young people. Skins betting and gambling, mentioned above, is the use of skins obtained in video games for betting purposes, either to win more skins, or money. Skins betting makes gambling available to young people via currency that they can gain during gaming, without needing to deposit money into a betting account (e.g., with a credit card). Both esports gambling (betting on professional video game competitions) and daily fantasy sports typically appeal to young, often underage people, particularly males (Macey & Hamari, 2019; Marchica et al., 2017).

Exposure to novel forms of gambling and gambling-like activities may make adolescents particularly vulnerable to gambling-related harm due to engagement with games featuring gambling-like content and early exposure to novel gambling activities such as skin betting. It is important to establish potential links between these emerging forms of gambling and harm, as early exposure to established gambling products is a key risk factor for subsequent gambling intentions during adolescence (Hing et al., 2014; Pitt et al., 2017b), gambling involvement, and gambling-related harm (Dowling et al., 2017). As some types of games either meet criteria for gambling, or include gambling-like mechanics (see King, 2018 for a taxonomy of these games), they thus constitute early exposure to gambling-like products. Because early formative experiences are crucial risk (and protective) factors for gambling-related harm, understanding the formative role of games with gambling-like

content and novel forms of gambling is crucial to understanding gambling harm going forward.

Social norms, social influences, and the role of parental and peer attitudes and behaviours

Social influences refer to behaviours or attitudes of others that influence one's own behaviour. Social influences are some of the most consistent predictors of behaviour in general, both positive (e.g., exercise; Laird et al., 2016), and potentially problematic behaviours (e.g., alcohol consumption; Leung et al., 2014). These influences can come from a range of sources, including family, friends and colleagues (Russell, Langham, & Hing, 2018; Russell, Langham, Hing, et al., 2018), and influences may be different from these sources. For example, parents may wish for their child to reduce a particular behaviour, but this behaviour may be an important within the child's friendship group.

Families, and particularly parents, play a central role in the development and wellbeing of adolescents. Sociodemographic characteristics of the family, including being of a minority cultural or ethnic background, growing up in a single-parent household and being of lower socioeconomic status, are associated with adolescent gambling (Calado et al., 2017). Further, exposure to gambling in the home increases the likelihood of later gambling in adulthood (Browne, Hing, et al., 2019; Dowling et al., 2017; Riley et al., 2021), with parents serving as important role models for their adolescent's gambling attitudes and behaviours. More positive attitudes towards gambling among parents tend to result in similar attitudes in their children (Pitt et al, 2017). Additionally, problem gambling is more likely to occur among adolescents with parents who gamble. Unlike other adolescent risk behaviours (e.g., alcohol use, smoking), parents often approve of, are involved in, and facilitate their children's gambling behaviour (McComb & Sabiston, 2010). In the NSW Youth Gambling Study (Hing et al., 2021), 54% of adolescents who gambled reported that their gambling usually occurred with parents/guardians, compared to 27% who reported gambling with adolescent friends. Further, gambling with parents during childhood and parental approval of gambling predicted gambling participation, while growing up with a problem gambling adult predicted problem/at-risk gambling among adolescents. Several studies have also found strong evidence for intergenerational transmission of gambling problems (Dowling et al., 2017, 2018; Forrest & McHale, 2021; Riley at al., 2021; Winters et al., 2002).

More general parenting behaviours not directly related to gambling are also likely to influence adolescent gambling. Although research on parenting and adolescent gambling is limited, there is evidence to suggest that parenting practices, particularly poor parental monitoring (i.e., knowledge and monitoring of the who, what and where of an adolescent's activities) and inadequate discipline and limit-setting are associated with higher levels of adolescent problem gambling, even after controlling for parent gambling, adolescent impulsivity and socioeconomic status (Vachon et al., 2004). On the other hand, adequate parental monitoring can protect against positive attitudes towards gambling, adolescent gambling and problem gambling (Canale et al., 2016; Dowling et al., 2017). Similarly, the quality of the parent-adolescent relationship may influence adolescent engagement in gambling. Parent-adolescent relationships characterised by warmth, connectedness, trust and involvement have been associated with lower levels of adolescent gambling, while disconnection and rejection from parents are associated with greater risk of problem

gambling (Magoon & Ingersoll, 2006). These findings are correlational, and as such, causation cannot be inferred.

There is also a connection between parental participation in simulated gambling and adolescent simulated gambling behaviour. Data from the Longitudinal Study of Australian Children (LSAC), which involves a large and representative sample of 2,936 children, indicated that adolescent girls' participation in simulated gambling games (e.g., EGM games, poker apps) was significantly higher if either their mother or father also played these games (Warren & Yu, 2019). No such association was found for adolescent boys. Parents can also facilitate engagement in simulated gambling, for example, providing funds to buy loot boxes (Ipsos MORI, 2019).

While family, especially parents, are key influences on a person's behaviour, the role of friends is also important. This is especially important in terms of simulated gambling, as many simulated gambling activities feature social components. For example, loot boxes tend to be in video games that include social components, such as in-game interaction (e.g., Counter-Strike: Global Offensive). Players who are skilled at these games may earn social status or credit from their peers through gameplay and showing off items from loot boxes, fostering further engagement (Zendle et al., 2019). A recent phenomenon is that of the social influencer, a person who earns money by streaming videos of themselves playing these games, or opening loot boxes. Money is earned through endorsement deals, and through advertisements to online audiences via streaming platforms such as YouTube and Twitch (Wulf et al., 2020). People who play their content via these platforms appear to do so for social reasons and to make money (Hilvert-Bruce et al., 2018).

For many players, the social aspects of these games are key motivations to play. These include the ability to socialise with peers while playing, but also to improve social status amongst a peer group, and to become a social influencer (Hollingshead et al., 2020; Nicklin et al., 2021; Sjöblom et al., 2017; Zendle et al., 2019).

Social influences on gambling behaviour are also apparent. A recent study examined social influences from family, friends and colleagues on gambling behaviour, and found that people who were in higher gambling risk groups had more influential people around them who gambled (Russell, Langham, & Hing, 2018; Russell, Langham, Hing, et al., 2018). Previous studies have also found that people classified as experiencing gambling problems felt closer to those with whom they gambled, drank and smoke, indicating that these activities may help to strengthen bonds, making it more difficult to remove these influences (Meisel et al., 2013). For some individuals, these influences were more likely to come from family or friends or colleagues, but on a sample level, there were no differences in terms of the strength of influence from these different sources. However, the causal direction is unclear. It is possible that respondents who gamble more tend to choose to associate more with people who also gamble, or it could be that associating more with people who gamble leads a person to gamble more.

The influences from family and friends described above fall under a blanket term of *social norms*. Social norms broadly fall into two categories: injunctive and descriptive. Broadly, injunctive norms refer to beliefs about how much a particular person or group of people approve of performing the behaviour of interest, whereas descriptive norms refer to beliefs about whether others actually take part in the behaviour themselves (Ajzen, 2020). Importantly, these are based on *perceptions*, which may or not be accurate. Importantly,

the beliefs about a person's attitudes or behaviours do not necessarily need to be accurate to influence one's own attitudes or behaviours (Cummings & Corney, 1987).

Associations between youth simulated gambling and traditional gambling engagement and harm

Most concerns about links between people under the age of 18 playing games and monetary gambling have not been empirically tested, but are extrapolated from research in other potentially addictive products (King, 2018). For example, Griffiths and Wood (2000) argued that even though money may not be involved, simulated gambling activities contain the same mechanisms and reinforcement as gambling, and may thus constitute early exposure to gambling-like products. A small number of studies have found that games with gambling-like content may promote or increase gambling amongst younger people. For example, in Australia, Gainsbury, Russell et al. (2016) found that 19.4% of social casino game users in their adult sample reported gambling as a direct result of social casino games, and this was higher amongst young adults. Amongst a sample of 561 Australian adolescents, 22.6% reported playing social casino games, and 28.4% of those reported that social casino games increased their gambling (Gainsbury, King, et al., 2015). Purchasing loot boxes has been associated with gambling engagement and gambling problems amongst 16-24 year olds in Great Britain (Wardle & Zendle, 2021). A prospective longitudinal study in Canada found a link between simulated poker and subsequent real-money poker gambling (Dussault et al., 2017). Adolescent use of social casino games in Australia has also been associated with underage financial gambling (King et al., 2016). The recent NSW youth gambling study found that engagement in simulated gambling was associated with traditional gambling (Hing et al., 2021). However, not all users of simulated gambling may experience harm from traditional gambling. Recent evidence suggests that only more engaged users of simulated gambling may experience harm from traditional gambling (Kristiansen & Severin, 2020).

It is well established that early exposure to gambling increases the risks of gambling-related harm in later life (Dowling et al., 2017; Johansson et al., 2009). However, it is unknown to what extent this same relationship holds for new products that include gambling-like content and subsequent gambling behaviour and harm (Drummond & Sauer, 2018; Floros, 2018; King, 2018; Macey & Hamari, 2018, 2019; Zendle & Cairns, 2018, 2019). Previous studies have found relationships between adolescent engagement with games featuring gambling-like content and later gambling problems (Zendle & Cairns, 2019). King et al. (2013) found that adolescents who had engaged in simulated gambling were more likely to indicate some problem gambling symptoms, although this effect was small. One prospective longitudinal study of adolescents in Norway found tentative links between problem gaming and problem gambling (Molde et al., 2018).

Most studies examining the relationship between simulated gambling and traditional gambling, and their related problems, do not take into account many other variables, particularly parental factors. A notable exception is the recent NSW Youth Gambling Study (Hing et al., 2021). Amongst 12-17 year olds, those who were classified as at-risk or 'problem gamblers' featured some of the risk factors described above, such as lower wellbeing, higher impulsivity, and being a more engaged gambler. In terms of parental factors, young people who were more likely to be at-risk or experiencing problems had parents who approved of gambling, had gambled with their parents when growing up, and

had grown up in a household with one or more adults who experienced gambling problems. This latter factor, growing up in a household with one or more adults with gambling problems, was also a unique predictor of problems when controlling for other predictors. Those at-risk or experiencing problems due to gambling were also more likely to engage with simulated gambling, including different forms such as playing games with gambling components, playing social casino or demo games, and buying loot boxes. However, this study examined concurrent simulated and traditional gambling engagement. There is an opportunity to examine whether simulated gambling precedes traditional gambling engagement.

Migration from simulated gambling to traditional gambling

One of the major themes of the literature around simulated gambling is that people start with simulated gambling and then migrate to traditional gambling later. A key issue is that simulated gambling is not restricted for those under the age of 18, and may constitute early exposure to gambling-like activities, priming users to take part in traditional gambling. Kim et al. (2015) discuss potential reasons for transitioning from playing for fun to playing to earn money in the context of social casino games. They argue that playing social casino games may lead to normalisation of gambling, and that people who believe that they develop skills during social casino games may believe that the skills transfer to gambling, although many social casino games are purely chance-based, such as simulated EGMs. They also argue that simulated gambling may provide entertainment, but that the level of entertainment is limited without the potential to win money. Thus, migration to gambling may be a natural result of taking part in social casino games, and possibly other simulated forms.

Associations between use of simulated forms and traditional gambling are often found, including for specific forms of simulated gambling, such as social casino games (Gainsbury, Russell, et al., 2016; Hing et al., 2021; Kim et al., 2015), loot boxes (Hing et al., 2021; Zendle et al., 2020) and demo games (Hing et al., 2021). These associations may not reflect actual migration, because they are based on cross-sectional research. However, at the least, they show that simulated gambling and traditional gambling appeal to many of the same people.

Two potential longitudinal studies have examined this migration pathway. Dussault et al. (2017) examined 1,220 young people who had never gambled with real money in Canada over three waves of data collection. They only found a migration pathway between simulated poker and poker with real money, but not other forms. Another longitudinal study by Hayer et al. (2018), based on a representative sample of 1,178 school students in Germany, found migration from simulated to traditional forms over a one year period, but only for particular forms (on social networks and via apps), and mostly for simulated gambling at home, rather than when out and about. At present, evidence for migration is based on retrospective cross-sectional data, or on limited longitudinal evidence.

Known risk or protective factors for gambling problems and harm

Browne et al.'s (2019) Model of Proximal and Distal Risk Factors for Gambling-Related Harm demonstrates which risk factors involve significant and unique links with gambling harm. Risk factors that are oft-cited in the gambling literature include factors such as youth, male gender, and gambling motivations (Shead et al., 2010). However, prior to Browne and colleagues' work, it was not known how many of these risk factors were simply correlates, rather than unique predictors of gambling-related harm. The study examined 25 risk factors for gambling-related harm in a sample of 1,174 respondents from Alberta, Canada. Almost all risk factors were significantly related to gambling-related harm in bivariate models. Penalised regression models, employed to counter multicollinearity issues, were employed to determine which factors uniquely explained variance in gambling-related harm. The models were split into distal risk factors (e.g., demographics) and proximal risk factors (e.g., erroneous gambling cognitions), in line with Williams et al. (2012).

One of the largest narrative reviews of adolescent gambling and its predictors examined 99 studies published between 1990 and 2010 (Ariyabuddhiphongs, 2013). The risk factors reported included many of the correlates that Browne et al. (2019) discuss, including gender and impulsivity, plus adolescent-specific risk factors, such as parenting practices. However, that review cautioned that future research focused on internet gambling and its impact on youth is necessary. A more recent review (Riley et al., 2021), which examined 85 studies over a 5-year period, included similar risk and protective factors and highlights the growing interest in adolescent gambling by researchers. The current study will use many of Browne et al.'s (2019) 25 risk factors, as well as additional youth-specific risk factors to investigate the transition from gaming- to gambling-harm in the internet age. These risk factors are briefly reviewed below.

Distal risk or protective factors

Demographics

Age, gender, marital/relationship status, highest completed education, work status, country of birth, Indigenous status, and income have all been identified as risk or protective factors for gambling harm (Abbott et al., 2015; Abbott & Volberg, 2000; Billi et al., 2014; Binde et al., 2017). The exact relationship depends on the nature of the sample (for example, any age inclusion criteria), and the type of gambling being considered. For example, in the NSW Youth Gambling Study, there was no evidence of a relationship between age and gambling problems amongst 12-17 year olds (Hing et al., 2021). In contrast, most studies of adult samples tend to find that younger respondents are most at risk (Russell, Hing, & Browne, 2019). Similarly, many prevalence studies find that lower income is associated with gambling problems in general (Office for Problem Gambling, 2013; Young et al., 2006), but the opposite is true when considering sports bettors (Russell, Hing, & Browne, 2019). However, whether certain demographic factors represent a unique risk factor is difficult to untangle from other risk factors. For example, gender differences exist in terms of other risk factors, such as impulsivity (Chapple & Johnson, 2007).

Wellbeing

Gambling problems has been associated with lower wellbeing and poor quality of life (Grant & Kim, 2005; Hare, 2015), although the exact relationship between wellbeing and gambling consumption is more nuanced. A recent study by Blackman et al. (2019) examined wellbeing amongst non-gamblers, two groups of non-problem gamblers (lower consumption and higher consumption), low-risk gamblers, and moderate-risk/'problem gamblers'. Wellbeing was highest amongst the high and low consumption non-problem gamblers, indicating that taking part in gambling without problems is not necessarily associated with lower wellbeing.

Trait impulsivity

Impulsivity has consistently been associated with the overconsumption of reward-oriented stimuli, including gambling (Goodwin et al., 2017; Harries et al., 2017). Fewer studies have examined the relationship between impulsivity and later gambling in children. However, a Canadian longitudinal study found that pre-adolescent gambling (starting at a mean age of 11.5 years) was not associated with parental gambling but was instead linked to impulsivity. The authors found that each point increase in impulsivity during kindergarten years (as measured by the Social Behavior Questionnaire completed by early childhood teachers) equated with a 25% increase in the likelihood of later childhood gambling (Pagani et al., 2009).

Social support

Social support is the perceived emotional assistance that people get from those in their social group, and is associated with more positive health outcomes, while lack of social support is associated with negative health behaviours such as smoking and alcohol consumption (Holt-Lunstad et al., 2010). This association has also been seen in respect to adolescent problem gambling where a perceived lack of social support was identified as a risk factor for pathological gambling amongst 12- to 18-year-olds (Hardoon et al., 2004). However, there are moderating factors. High social support from parents is associated with fewer 'problem' behaviours and less gambling, while high social support amongst male peers is associated with an increased likelihood of problem behaviours and gambling (Räsänen et al., 2016).

Mental health diagnosis

Youth gambling problems are positively correlated with mental health disorders including depression and anxiety (Dowling et al., 2017). In these cases, gambling may act as an escape from negative emotional states (Gupta & Derevensky, 1998). This type of coping strategy is also present in many adults with problem gambling and aligns with the Pathways Model of Problem and Pathological Gambling (Blaszczynski & Nower, 2002). In addition, pathological video-gaming in youth—a quickly growing mode for monetised simulated gambling—is associated with depression (Liau et al., 2015).

Alcohol issues

Population studies show a robust link between gambling problems and alcohol abuse. In Victoria, nearly half of all adults with a gambling problem also have a problem with alcohol use, compared to 14% of no-risk gamblers (Billi et al., 2014). Consuming alcohol while gambling causes people who are most likely experiencing problems from their gambling to

place riskier bets and gamble more rapidly (Ellery & Stewart, 2014; Ellery et al., 2005; Phillips & Ogeil, 2007). When considering young people, adolescence is a common time to experiment with alcohol and over one-third of Australian youth (mean age 16 years) report binge drinking (Aiken et al., 2018). A recent Victorian study of 3,746 adolescents found that drinking alcohol in the previous week was associated with problem gambling (Freund et al., 2019).

Early exposure to gambling

Early exposure to gambling products has consistently been observed as a key risk factor for gambling-related harm (Dowling et al., 2017). As many games now include gambling-like elements, it is possible that early exposure to these games during adolescence may be a risk factor for subsequent gambling and gambling-related harm. Amongst adolescents in Victoria Australia, those with a parent, best friend or sibling who gambled were more likely to have ever gambled, to have gambled in the last month, and to have a gambling problem. Those who had been inside a venue where gambling is available in the last 30 days and who had seen gambling promotions in the last month were also more likely to gamble (Freund et al., 2019).

Age of gambling onset

Gambling on traditional gambling products prior to the age of 13 is a robust risk factor for experiencing problem gambling in one's lifetime (Dowling et al., 2017; Riley et al., 2021). This likelihood of developing adulthood gambling problems lessens as age of gambling onset increases, with those first gambling between the ages of 13 and 18 at a higher risk than those gambling first between 18 and 24 (Abbott & Volberg, 2000). However, Abbott and Volberg (2000) found that gambling first after age 24 was also related to problem gambling.

Peer and parental gambling norms

Peer and parental gambling norms in terms of gambling are also related to gambling risk in youth. A South Australian study showed that adolescents who believed that their friends and family approved of gambling and that their friends and family gambled a lot were more likely to frequently gamble themselves (Delfabbro & Thrupp, 2003). These results were broadly supported by the NSW youth gambling study (Hing et al., 2021). Similar results have been found in research into other risky youth behaviours, such as alcohol consumption. Young adults who report that their parents hold more permissive views about the consumption of alcohol binge drink more frequently than those who believe that their parents have more negative views (M. D. Wood et al., 2004).

Because many games include social elements, and social recognition can motivate game-playing, peer influences and norms can also result in playing longer and/or spending more money (King, 2018). Furthermore, adolescents may play games to reduce the "fear of missing out" (Przybylski et al., 2013). Being recognised amongst peers for gaming skill can also bring social status (Castrén et al., 2015). Therefore, peer influences and norms can provide powerful motivations for video gaming, because social acceptance is particularly important to adolescents (Silk et al., 2012).

Parental gambling behaviour and gambling problems

Parental acceptance of gambling has been well established as being associated with adolescent gambling on traditional forms, with many reports of first gambling experiences being with family members (Gupta & Derevensky, 1997; Wickwire et al., 2007). In addition, the intergenerational transmission of problem gambling is firmly established, with children of people who experience gambling problems being 2-4 times more likely to experience problems due to gambling themselves (Dowling et al., 2010).

Proximal risk or protective factors

Proportion of friends who gamble

As mentioned above, adolescents who believe that most of their friends gamble are more likely to gamble frequently than adolescents who report that most of their friends do not gamble (Delfabbro & Thrupp, 2003). The alcohol literature also shows that consumption in youth is more likely if one's peer group consumes alcohol (Ajilore et al., 2016).

Proportion of gambling conducted online

Individuals who gamble both online and on land- or venue-based forms of gambling are more likely to have higher Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001) scores and to engage in a greater variety of gambling types than those who only gamble on the internet or only gamble on land-based forms (Blaszczynski et al., 2016). Mixed mode gambling is also likely to be done by younger age groups (Gainsbury, Russell, Blaszczynski, et al., 2015). In Australia, this is an important consideration since online gambling may offer easier access to gambling forms than via venues, where age verification should be checked each time (Hing et al., 2021). This is important due to the risk that mixed mode gambling poses and the fact that traditional forms of gambling, such as EGMs, still represent a very high risk to those that migrate to them (Calado & Griffiths, 2016).

Gambling urges

Urges to gamble are frequently experienced by people with a gambling problem (Sharpe, 2002). One novel study used functional magnetic resonance imaging to measure structural changes in the brain that were associated with gambling urges. People experiencing problems from their gambling showed less activation in the frontal brain regions associated with impulse regulation than controls (Potenza et al., 2003). Several studies have since also used fMRI to better understand neural mechanisms underlying impaired cognitive control over gambling, with one review examining 14 studies (Moccia et al., 2017). It concluded that that impaired activity in the prefrontal cortex may explain reduced cognitive control in gambling disorder, contributing to a progressive loss of control over gambling urges. Due to the slow development of the frontal cortex, adolescents may be more at risk of succumbing to gambling urges (like people experiencing problems from their gambling). Adolescents have been found to have higher tolerance of ambiguity, such as situations where the likelihood of winning losing are unknown, which may explain their greater risk-taking propensity (Tymula, 2012).

Erroneous cognitions

Erroneous cognitions related to gambling are often a result of cognitive bias and mental shortcuts (heuristics), and are common amongst people who experience problems from

their gambling (Goodie & Fortune, 2013). This is also the case in samples of youth who experience gambling problems in Australia (Delfabbro et al., 2009). Wood and Williams (2009) also reported that beliefs in more gambling fallacies was a predictor of experiencing problems due to internet gambling.

Gambling motivations

An individual's motivations for engaging in gambling may increase or decrease their likelihood of experiencing gambling harm. The Gambling Outcomes Expectancies Scale (GOES) is based on five domains of motivation to gamble, including excitement, escape, ego enhancement, money and social (Flack & Morris, 2015, 2016). People who experience problems from their gambling are more likely to gamble for excitement and escape, according to this model. Support from longitudinal population studies shows that people who start off as non-problem gamblers are motivated by socialisation but, if they develop problems, gambling as an escape from negative mood states, such as stress, becomes their main motivation (Clarke et al., 2007). This is consistent with the addictions literature which has found a shift from positive to negative reinforcement as addictions develop (Baker et al., 2004; Blume et al., 2001; Pantazis et al., 2021).

Risk or protective factors related to the harmful use of gambling-like products during adolescence

Gaming-related harm

Excessive internet gaming is associated with a variety of harms, including in the domains reported by Langham et al. (2016). Harms experienced due to gaming disorder include emotional and psychological distress, such as increased aggression and decreased self-esteem, and harm to relationships, manifesting as loneliness (Lemmens et al., 2015).

Parent-adolescent relationship

Protective parental influences include the nature of the parent-child relationship , for example, warmth and connectedness or lack of conflict and negativity (Leeman et al., 2014; Rehbein & Baier, 2013; Schneider et al., 2017). Research into adolescent involvement in traditional gambling indicates that adolescents who report better connectedness and trust with their parents are less likely to take part in gambling or to be classified as a 'problem gambler' (Magoon & Ingersoll, 2006). Further, parental involvement with their adolescent can buffer the relationship between maternal problem gambling and adolescent problem gambling (Dowling et al., 2017). Research into pathological video gaming has shown that parent-adolescent connectedness is a protective factor for the development of pathological gaming (Liau et al., 2015) and may be a more important factor than parental restrictions of gaming (Choo et al., 2015). Similar results were found when examining 12-17-year-old internet gamers, with those with poorer relationships with their parents more likely to show Internet Gaming Disorder symptoms (King & Delfabbro, 2017).

Parental supervision of gaming

Parental influences that restrain or decrease adolescent gaming can be protective factors for gaming-related harm, and compete with peer influences (Wang et al., 2017). Parental monitoring is a term used to describe how much knowledge parents have about their child's activities both in and outside of the home environment. High parental monitoring is associated with high child self-control and can also reduce the influence of peers on behaviour (Flexon et al., 2012). Data from the Pacific Island Family Study showed that more than one third of nine year-olds had participated in gambling, without any link between mother and child gambling. However, ineffective parental monitoring was associated with 1.66 times greater likelihood of child gambling (Bellringer et al., 2014). In relation to adolescents' online behaviour, overall parental monitoring and supervision has been found to have a stronger and direct effect on reducing online harassment risk than parental internet restrictions (Khurana et al., 2015). Exploratory research into strategies that can be used to limit loot box consumption (Gong & Rodda, 2020) highlighted the potential parental strategies of environmental restructuring, persuasion and monitoring.

Motivations for gaming

Individuals are motivated to participate in video gaming for different reasons. Games vary in required complexity and skill and developing the necessary skills to master a game can take considerable time (King et al., 2010). This sense of mastery and achievement, along with identity expression and escapism, have been identified as psychological needs that can be fulfilled by video games (Ryan et al., 2006), which may encourage excessive play. Four common motivations are overall regulation (e.g., because it is an integral part of my life), intrinsic motivation (e.g., because it is stimulating to play), external regulation (e.g., to acquire powerful and rare items and virtual currency or to unlock hidden/restricted elements of the game) and amotivation (e.g., lack of motivation to engage in other aspects of life) (Brühlmann et al., 2018).

The current study

Most studies examining associations between simulated gambling and traditional gambling do so with cross-sectional methodologies, and do not control for other known factors associated with traditional gambling. Further, parental norms and parent-adolescent relationships appear to be key predictors of risk behaviours largely unexplored by previous studies. Social influences from parents and friends may conflict, since parents may wish to restrict gaming in general, including simulated gambling, but friends may wish to play games together.

The present study aims to explore these themes by:

- Conducting an online survey of 18-25 year olds to determine the relationship between adolescent engagement with games that include gambling-like content, and gambling and gambling-related harm in young adulthood;
- Conducting bivariate and multivariate risk factor models to determine if adolescent engagement in games with gambling-like features is a unique risk factor for gambling and gambling-related harm in young adulthood;
- Using a well-established retrospective public health methodology to determine if adolescent engagement with games with gambling-like features predicts

subsequent gambling behaviour or gambling-related harm at any point during adolescence or young adulthood.

Research questions

The three research questions for this project were:

1. Is playing games with gambling-related content associated with subsequent gambling behaviour and gambling-related harm, including at any point during adolescence and young adulthood?

2. Are certain types of parenting styles (e.g., hostile), or other parental factors (e.g., supervision, norms) related to adolescent games with gambling-like content, associated with greater (or lower) risk of subsequent gambling engagement and gambling-related harm?

3. What roles do gaming motivations and competing social influences (from peers and parents), have in engagement with games with gambling-like features during adolescence and subsequent gambling behaviour and gambling-related harm?

In this study, we refer to parents for the sake of brevity. However, the survey instrument asked about parents/guardians, recognising that not all respondents may have grown up with their parents. While we refer to parents below, findings also apply to guardians.

Approach

Recruitment, inclusion and exclusion criteria, quotas and completion rate

Respondents were recruited via multiple market research panels with the assistance of Qualtrics. A soft launch was conducted on 6th November 2020. The data from this soft launch were checked and the survey was confirmed to be working as intended. Full launch started on the 9th November 2020, with recruitment completed by 26th November 2020.

Respondents were required to consent to take part in the survey, to be aged 18 to 25 years, to have played video games within the last 12 months and to pass an attention check within the survey. Quotas were used so that the sample was approximately 50% from Victoria (the location of the funding body) and 50% from the rest of Australia, based on the postcode of their primary residence. A total of 2,619 participants started the survey. Of those, 794 were screened out because they were outside of the required age range, 167 did not give consent, 110 failed the attention check, 110 were not video gamers, 12 did not give a postcode, and 51 were not from Victoria (once the non-Victorian quota had been filled), for a total of 1,244 exclusions. Quotas were also set to ensure approximately equal numbers of males and females (both within Victoria and in the rest of Australia).

In addition to the exclusions above, Qualtrics and the research team also examined the data for poor quality responses, as is their usual practice, excluding 120 respondents. Some respondents were excluded for more than one reason, so these numbers sum to more than 120. Of these 120 excluded respondents, 76 were duplicate responses (i.e., people recruited from two separate panels who completed the survey twice), 36 were poor quality responses (e.g., inconsistent responses throughout the survey), 19 straightlined through some or all of the survey (i.e., indicated the same answer through scales when it was inappropriate to do so), seven completed the survey in under 1/3 the median response time from a pilot launch, and five had IP addresses that indicated that they were outside of Australia. All were excluded from the final analysis.

It is unknown how many respondents were invited to the survey, so a response rate cannot be calculated, but of the eligible 1,255 respondents, 1,026 completed the survey (for a completion rate of 81.8%).

Survey instrument

A copy of the survey instrument can be found in the appendix. Please see the appendix for exact question wording.

Introduction and consent

Upon starting the survey, respondents read a brief description of the study, outlining the purpose of the study, and that the survey was anonymous, voluntary and that they could withdraw at any time prior to submitting their data. If they wished, they could view more details about the study, such as details about how their confidentiality would be protected, where they could go to get further information about the study and contact details for help

services. They were then asked to indicate that they consented to take part. If respondents declined to consent, they were thanked for their time and screened out of the survey.

Screening questions

Respondents were asked four screening questions, to determine if they were eligible for the survey, or for quotas. Respondents were asked their age, and anyone under 18 or older than 25 was screened out. Respondents then indicated their gender (male, female, other), with a quota that no more than 60% of the sample could be male or female, to ensure an approximate gender balance. Postcode was collected, so that half of the sample were from Victoria and half from outside of Victoria. Finally, respondents indicated how often they played video games, including games on their smartphone, tablet, PC or console. Respondents who indicated “never in the last 12 months” were screened out.

Defining traditional gambling forms

We use the term “traditional” in the sense that these forms meet criteria for gambling in that something of value is staked, for the possibility of winning something of value, based at least in part on chance (King, 2018). We note that some of these forms are particularly new, such as betting on esports, daily fantasy sports, and skins gambling. However, they meet the criteria for gambling outlined above, and are therefore considered forms that meet traditional gambling criteria, even though they may not have a strong tradition themselves. The 12 traditional forms in this study are listed in Table 1.

Table 1 – List of traditional gambling forms

Traditional gambling forms
Buying lottery tickets
Buying instant scratch tickets
Playing the pokies
Betting on a sporting event
Betting on novelty events (like who will win a reality TV show or election)
Betting on a racing event
Playing bingo
Playing Keno
Playing casino table games
Betting on an esports event (a professional video game competition)
Entering into a paid fantasy sports or daily fantasy sports competition
Gambling using skins or skin deposits

Engagement with traditional gambling forms

Respondents were asked which of these 12 traditional gambling activities they had taken part in at any point during their life. This information was used later in the survey to determine who was asked particular questions. For example, if a respondent indicated that they had never taken part in playing Keno, they were not asked any subsequent questions about Keno.

For each traditional form that respondents had done in their lifetime, they were asked how frequently they had engaged in that form in the last 12 months (never in the last 12 months to 4 or more times a week). If they had engaged in a form in the last 12 months, they were asked their expenditure (not including winnings) in a typical month. Respondents were also asked how much of their gambling was usually online, across all forms, from 0 to 100%.

For each traditional form that they had done in their lifetime, they were asked the age that they had first taken part, the age that they had most recently taken part and the age at which they most frequently took part in that activity. Respondents were asked how frequently they had taken part in that activity at the age that they were most frequently engaged. Survey programming ensured that respondents could not enter ages that were logically inconsistent, such as first taking part in an activity when they were older than their current age, and this was conveyed to respondents within each question, to reduce frustration and attrition. Further, because people under 18 years of age are not legally allowed to take part in traditional gambling forms, respondents were reminded that the survey was anonymous for these questions, to reduce social desirability bias.

Social norms related to traditional gambling

Traditional gambling norms were measured using parts of the Theory of Planned Behavior questionnaire, based on instructions by one of the theory's authors (Ajzen, 2006). Norms were captured for friends, parents/guardians, and family members separately. For each of these three groups, we asked four questions, each with response options from 1 (disagree) to 7 (agree) or, for identification with the referent, 1 (not at all) to 7 (very much). Injunctive normative beliefs were captured by multiplying scores from two of these items: injunctive normative belief strength (e.g., "When I was growing up, my friends would have approved if I gambled") and motivation to comply (e.g., "When I was growing up, when it came to gambling, I wanted to do what my friends thought I should do"). Descriptive normative beliefs were captured by multiplying scores from the other two items for that group, specifically descriptive normative belief strength (e.g., "When I was growing up, most of my friends gambled") and identification with the referent (e.g., "When you were growing up, when it came to gambling, how much did you want to be like your friends?").

In addition, respondents were asked how many of their friends currently gambled (none, some, most, all).

Gambling Urge Scale (GUS)

The six-item GUS was used to measure gambling urges (Raylu & Oei, 2004). Each item is scored on a scale from 0 (strongly disagree) to 6 (strongly agree), and scores are summed

for a total between 0 and 36. Higher scores indicate higher gambling urges. Cronbach's alpha and McDonald's omega were both .966.

Gambling motivations

Gambling motivations were measured using the 18-item Gambling Outcomes Expectancies Scale (GOES) (Flack & Morris, 2015, 2016). This measure includes five subscales: excitement, escape, ego enhancement, money and social. Items are scored from 1 (strongly disagree) to 6 (strongly agree), and relevant items are summed to form each subscale. Cronbach's alpha for the subscales ranged between .852 and .924, while McDonald's omega ranged between .854 and .924.

Erroneous cognitions

The 10-item Gambling Fallacies Measure scale was used to measure erroneous gambling cognitions (R. T. Wood & Williams, 2009). Responses for each item were scored as correct or incorrect, and the number of incorrect items was summed for a total out of 10, with higher scores indicating higher erroneous cognitions. Reliability was indicated by Cronbach's alpha = .697 and McDonald's Omega = .813.

Problem Gambling Severity Index (PGSI)

The PGSI (Ferris & Wynne, 2001) was used to measure problem gambling severity over the last 12 months. Respondents who gambled in the last 12 months responded to the nine items with response options from 0 (never) to 3 (almost always), for a total score of 0-27. Higher scores indicate higher problem gambling severity. Respondents were also classified into categories based on the standard cut-offs: non-problem (0), low-risk (1-2), moderate risk (3-7) and 'problem' (8-27). Cronbach's alpha was .940 and McDonald's omega was .941.

Gambling harms: Short Gambling Harm Screen (SGHS)

Gambling harm was measured amongst gamblers using the 10-item Short Gambling Harm Screen (Browne et al., 2017), which assesses whether respondents have experienced each of 10 harms from their gambling over the last 12 months (0 = no, 1 = yes for each item). The number of endorsed items is summed to give a total score between 0-10. Cronbach's alpha was .940, and McDonald's omega was .941.

Lifetime gambling problems

The NODS-CLiP Short Problem Gambling Screen was used to assess gambling problems in the respondents' lifetime (Toce-Gerstein et al., 2009). The NODS-CLiP was asked of all respondents who indicated gambling at any point in their lives, whether or not this included the last 12 months. The NODS-CLiP consists of three items, each with a no/yes response option. Endorsement of one or more of the three items indicates gambling problems in the lifetime.

Defining exposure forms and simulated gambling forms

In contrast to traditional forms, these activities involve various degrees of exposure to gambling-like components, but do not meet all three criteria for traditional gambling (something of value put at risk, on an outcome determined at least in part by chance, to

gain something of value). These forms may be vastly different to each other, and we did not consider it appropriate to classify them all as simulated gambling. Instead, we split them into two groups, “exposure” forms and “simulated gambling” forms.

The ”exposure” forms were those where respondents might be exposed to content that is associated with gambling, such as playing a game that is also an esport or watching an esport online, without actually staking anything of value, or the chance to win anything. They were included because they involve exposure to these activities that are linked to gambling. Similarly, opening a free loot box or entering a free fantasy sports competition may not be classified as simulated gambling, but this is a grey area and other researchers may come to a different conclusion. For the purposes of these results, we classified these forms as “exposure” forms, where respondents might be exposed to how these forms work, but are not required to pay any money to play, and the mechanics of these forms do not constitute gambling.

In contrast, the forms that we have defined as “simulated gambling” are activities where engagement with these forms involves interacting with gambling-like mechanics. Playing games with gambling components, for example, involves interacting with gambling content in the game. Social casino games and demo games are solely about experiencing gambling content, although no money can be won, even if money can be staked on some social casino games. Buying loot boxes is classified as gambling in some jurisdictions, but not in Australia. Thus, we have classified them as simulated gambling in this study. The forms are defined in Table 2. Where possible, individual forms are assessed in the analysis, although for some analyses simulated gambling forms are classified together into a general engagement variable. In these cases, simulated gambling refers to engagement with the last five forms in Table 2.

Table 2 – List of exposure forms and simulated gambling forms

Exposure gambling forms	Simulated gambling forms
Playing a video game which is also an esport	Playing video games games with gambling components, like Grand Theft Auto’s casino level
Watching an esports event (either online or in person)	Buying a loot box with real money or via virtual currency that you purchased with real money
Opening a loot box that you earned during a game	Playing gambling-like games (e.g., simulated pokies, poker, roulette) for free via an app or on social networking sites (social casino games)
Entering into a free fantasy sports or daily fantasy sports competition	Paying to play gambling-like games (e.g., simulated pokies, poker, roulette) via an app or on social networking sites (e.g., paying to play through in-game purchases) (social casino games)
	Free demo or practice games on real gambling websites or apps, for example Mobile Casinos.

Engagement with exposure and simulated gambling forms

Like the traditional gambling forms, respondents were first asked which of the nine exposure or simulated forms they had ever done in their lifetime. If a respondent reported doing each form, they were asked how frequently they had engaged in that form in the last

12 months (never in the last 12 months to 4 or more times a week). If they had engaged in a form in the last 12 months, they were asked their expenditure (not including winnings) in a typical month for forms where money can be spent (buying loot boxes and paying to play social casino games).

Respondents who took part in each form at any time in their lifetime were asked the age at which they had first taken part, the age at which they had most recently taken part, the age at which they most frequently took part, and how frequent their engagement was at that age. As for traditional gambling forms, survey programming ensured that respondents could not enter ages that were logically inconsistent, such as first taking part in an activity when they were older than their current age.

Social norms related to simulated gambling

At this point in the survey, the term “simulated gambling” was defined for respondents, and the following questions were asked specifically in relation to simulated gambling, rather than exposure forms, unless otherwise specified below.

Social norms relating to simulated gambling were captured in a similar way to traditional gambling norms (see above). Injunctive normative beliefs and descriptive normative beliefs were measured separately for friends, parents/guardians and other family members, using parts of the Theory of Planned Behaviour questionnaire (Ajzen, 2006).

Respondents were also asked how many of their friends took part in simulated gambling (none, some, most, all).

Parental gaming supervision

Parental gaming supervision was assessed with a single question that asked respondents how much they agreed or disagreed with the following statement: “When I was growing up, my parents or guardians restricted or banned me from playing certain video games they considered undesirable.” Respondents replied on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree).

Gaming motivations - Electronic Gaming Motives Questionnaire (EGMQ)

The EGMQ was used to measure gaming motives (Myrseth et al., 2017). The EGMQ consists of 14 items, with response options from 1 (almost never/never) to 4 (almost always), and there are four subscales: enhancement, social, coping and self-gratification. Reliability for the subscales varied from .875 to .887 (Cronbach’s alpha) and from .874 to .887 (McDonald’s omega).

Internet Gaming Disorder (IGD)

Problematic gaming was measured with the Internet Gaming Disorder scale, which consists of nine items (Petry et al., 2014). Response options are no and yes. A score of 5 or more indicates problematic gaming, as long as one of the endorsed items is the last item: ‘did you risk or lose significant relationships, or job, educational or career opportunities because of gaming?’. Reliability was indicated by Cronbach’s alpha = .847

and McDonald's omega = .846. Importantly, this question was asked in relation to any gaming, not just simulated gambling engagement.

Parent-Adolescent Relationship Scale (PARS)

The nature of parent adolescent relationship was assessed using the Parent-Adolescent Relationship Scale (PARS), a 15-item scale assessed on a Likert scale from 0 (not at all true) to 5 (nearly always or always true) (Burke et al., 2021). The scale was slightly modified for the current study based on the timeframe ("when you were growing up, before you turned 18") and to include guardians ("your parent or guardian") for all items. Three subscales assess parental involvement, connectedness and hostility. Reliability was assessed for all subscales: involvement (Cronbach's alpha = .813, McDonald's omega = .821), connectedness (Cronbach's alpha = .913, McDonald's omega = .913) and hostility (Cronbach's alpha = .839, McDonald's omega = .839). Higher scores on each subscale represent more of the construct.

Impulsiveness (BIS-Brief)

Impulsiveness was assessed using the eight item Brief version of the Barratt Impulsiveness Scale (Steinberg et al., 2013). Response options are assessed on Likert scales from 1 (rarely/never) to 4 (almost always/always). Items 1, 4, 5 and 6 are reverse-coded, and then all items are summed, for a total score potentially ranging between 8 and 32. Reliability was .676 (Cronbach's alpha) and .585 (McDonald's omega).

Wellbeing

Wellbeing was assessed with a single item, "How satisfied are you with your life as a whole now?" with response options from 0 (No satisfaction at all) to 10 (completely satisfied). This item was taken from the Personal Wellbeing Index (International Wellbeing Group, 2013).

Perceived Social Support Questionnaire (brief F-SozU or PSSQ)

The PSSQ was developed by Kliem et al. (2015), as a shorter version of the 54-item *Fragebogen zur sozialen Unterstützung* (F-SozU) (Fydrich et al., 1999). The scale consists of six items, each rated 1 (not at all true) to 5 (very true), assessing perceived social support. Scores were summed for a total from 6-30, with higher scores indicating higher perceived social support. Reliability was Cronbach's alpha = .881 and McDonald's omega = .882.

Psychological Distress (Kessler 6)

The six-item Kessler-6 questionnaire was used to measure psychological distress over the last 30 days (Kessler et al., 2010). The six items are the same for all applications of the Kessler-6, but different scoring methods have been identified based, both on how each item is scored, and cut-offs for classification of probable psychological distress, with different researchers using two, three, four or even five categories (Australian Bureau of Statistics, 2012). In the present study, the Australian scoring was used (each item coded from 1 to 5 and summed), with scores from 6-18 indicating no probably serious mental illness, and scores from 19-30 indicating probable serious mental illness. Reliability was Cronbach's alpha = .902 and McDonald's omega = .904.

Alcohol Use Disorders Identification Test (AUDIT-C)

The AUDIT-C consists of three items assessing frequency of drinking alcoholic beverages (coded 0 to 4), number of standard drinks consumed on a typical day when a drink is consumed (coded 0 to 4) and frequency of drinking six or more standard drinks on one occasion (coded 0 to 4) (Babor et al., 1992). Scores are summed for a total out of 12, with higher scores indicating higher levels of hazardous drinking. While some studies use cut-offs for hazardous drinking, different studies may use different cut-offs. For this reason, the continuous score (0-12) was used for analysis. Reliability statistics were Cronbach's alpha = .729 and McDonald's omega = .766.

Data analysis

The data analysis involved two main sets of analyses. First, we considered the ages at which respondents reported first, most recently and most frequently taking part in each exposure, simulated and traditional form. The 'age first' and 'age most recent' variables were used to determine the proportion of respondents who took part in each form at each age. This makes the assumption that they did so in each year between the first and most recent ages which may not be the case for some respondents. Nonetheless, this was considered an appropriate approach which allowed for the identification of overall trends. The 'age first' responses were used to determine the temporal sequence of onset of simulated and traditional gambling products by each possible pairing (e.g., free social casino games with pokies/EGMs, paid loot boxes with esports betting). These analyses were conducted both in terms of comparative mean ages of onset of each form, and the proportion of respondents who engaged in both forms in any pair of forms, but who did one before the other. Any responses below the age of 10 for any of these variables were treated as 10 years of age, to minimise skew. Analyses were conducted using pairwise non-parametric Wilcoxon signed-rank tests (comparing mean ages of onset) and chi-square goodness of fit tests (comparing proportion who started one form before the other in a pair). These analyses were also conducted for the age at which respondents most frequently took part in each form.

The second set of analyses involved risk factor analyses. We use the term "risk factor" in a broad sense, since some of the outcomes are engagement in traditional gambling forms, which may not represent a risky behaviour in and of itself. First, bivariate associations between engagement in each form of simulated gambling (separately for lifetime and for last 12 months) were associated with traditional gambling outcomes (engagement and experiencing gambling problems due to traditional gambling), using logistic or linear regressions, depending on the nature of the traditional gambling outcome variable. Because the results were generally similar for all forms, this was later reduced to use of any of the simulated gambling forms in multivariate models (see below).

The main variables of interest for two of the research questions were parent-adolescent relationship dimensions and other parental factors (e.g., norms, gaming supervision), as well as gaming motivations and social influences. These were associated in bivariate analyses with both simulated and traditional gambling engagement, and problems (both last 12 months and lifetime), again using logistic or linear regressions as appropriate for the dependent variables.

Multivariate analyses were then conducted to determine if engagement in simulated gambling, parent-adolescent relationship dimensions, other parental factors (e.g., norms, supervision), gaming motivations and norms were associated with traditional gambling engagement and problems when controlling for other known risk factors/predictors. These multivariate analyses are described in further detail below, because choices about the inclusion of predictor variables were made based on the preceding bivariate results. As outlined in the multivariate section of the results, the predictors were split into distal and proximal models.

The survey featured compulsory responding to all questions, unless questions were skipped by design (e.g., if respondents did not bet on sports in their lifetime, they did not have answers for subsequent sports betting variables). PGSI and gambling expenditure were positively skewed and therefore log-transformed to reduce the skew. An alpha of .05 was used throughout, and 95% confidence intervals are reported.

Results

Demographics

Full sample demographics are reported in Table 3. The sample included slightly more females than males (59.1% vs 40.2%) and eight respondents identified as a gender other than male or female. Respondents were aged from 18-25 years, with a mean of 21.87 (*SD* = 2.32). Approximately half of the respondents reported living in the state of Victoria, and half elsewhere in Australia. In line with the sample's young age, almost two-thirds were single/never married, and the most common educational qualifications were completing year 12 (high school), a trade or technical certificate or diploma, or an undergraduate degree. More than half of the sample worked full-time or part-time/casual, with a further quarter studying full-time. Around four in five were born in Australia, and 6.7% identified as Aboriginal and/or Torres Strait Islander. Around four in ten lived with their parents.

Table 3 - Sample demographics (*N* = 1,026)

Variable	Level	N	%
Age; mean (SD)			21.87 (2.32)
Gender	Male	412	40.2
	Female	606	59.1
	Other	8	0.8
State of residence	Victoria	512	49.9
	Elsewhere in Australia	514	50.1
Marital status	Single/never married	664	64.7
	Living with partner/ de facto	254	24.8
	Married	94	9.2
	Divorced or separated	12	1.2
	Widowed	2	0.2
Highest level of education	Did not complete year 12 or equivalent	63	6.1
	Completed year 12 or equivalent	400	39.0
	Completed trade or technical certificate or diploma	192	18.7
	Completed an undergraduate qualification	288	28.1
	Completed a postgraduate qualification	83	8.1
Work status	Work full-time	303	29.5
	Work part-time or casual	293	28.6
	Self-employed	40	3.9
	Unemployed and looking for work	94	9.2
	Full-time student	249	24.3
	Full-time home duties	31	3.0
	Retired	5	0.5
	Sick or disability pension	10	1.0
	Other	1	0.1
Country of birth	Australia	812	79.1
	Other	214	20.9
Aboriginal or Torres Strait Islander status	No	957	93.3
	Yes, Aboriginal	49	4.8
	Yes, Torres Strait Islander	15	1.5
	Yes, both Aboriginal and Torres Strait Islander	5	0.5
Household composition	Live alone	161	15.7
	Single person with child(ren)	36	3.5
	Live with partner, with child(ren)	93	9.1
	Live with partner, no child(ren)	194	18.9
	Live with parents	391	38.1
	Group household	150	14.6
	Other	1	0.1
Income – weekly (annual)	Negative income	21	2.0
	Nil income	108	10.5
	1-199 (1-10.399)	125	12.2
	200-299 (10,400-15,599)	82	8.0
	300-399 (15,600-20,799)	76	7.4
	400-599 (20,800-31,199)	131	12.8
	600-799 (31,200-41,599)	86	8.4
	800-999 (41,600-51,999)	108	10.5
	1,000-1,249 (52,000-64,999)	110	10.7
	1,250-1,499 (65,000-77,999)	78	7.6
	1,500-1,999 (78,000-103,999)	60	5.8
	2,000+ (104,000+)	41	4.0

Engagement with exposure, simulated and traditional gambling forms

Engagement with exposure and simulated gambling forms is shown in Figure 1, both for lifetime (blue) and in the last 12 months (orange). Around half of the respondents had taken part in playing esports video games, watching esports, opening free loot boxes, playing video games with gambling content, and playing free social casino games in their lifetime. Around a quarter to a third had taken part in free fantasy sports, paid loot boxes, paid social casino games and demo games.

Engagement with traditional forms is shown in Figure 2. The most popular forms (lifetime) were scratch cards, lottery tickets, sports betting, pokies/EGMs, bingo, race betting and casino games. Newer forms, such as esports betting, fantasy sports betting and skins gambling were less popular. A similar pattern was observed with engagement in the last 12 months.

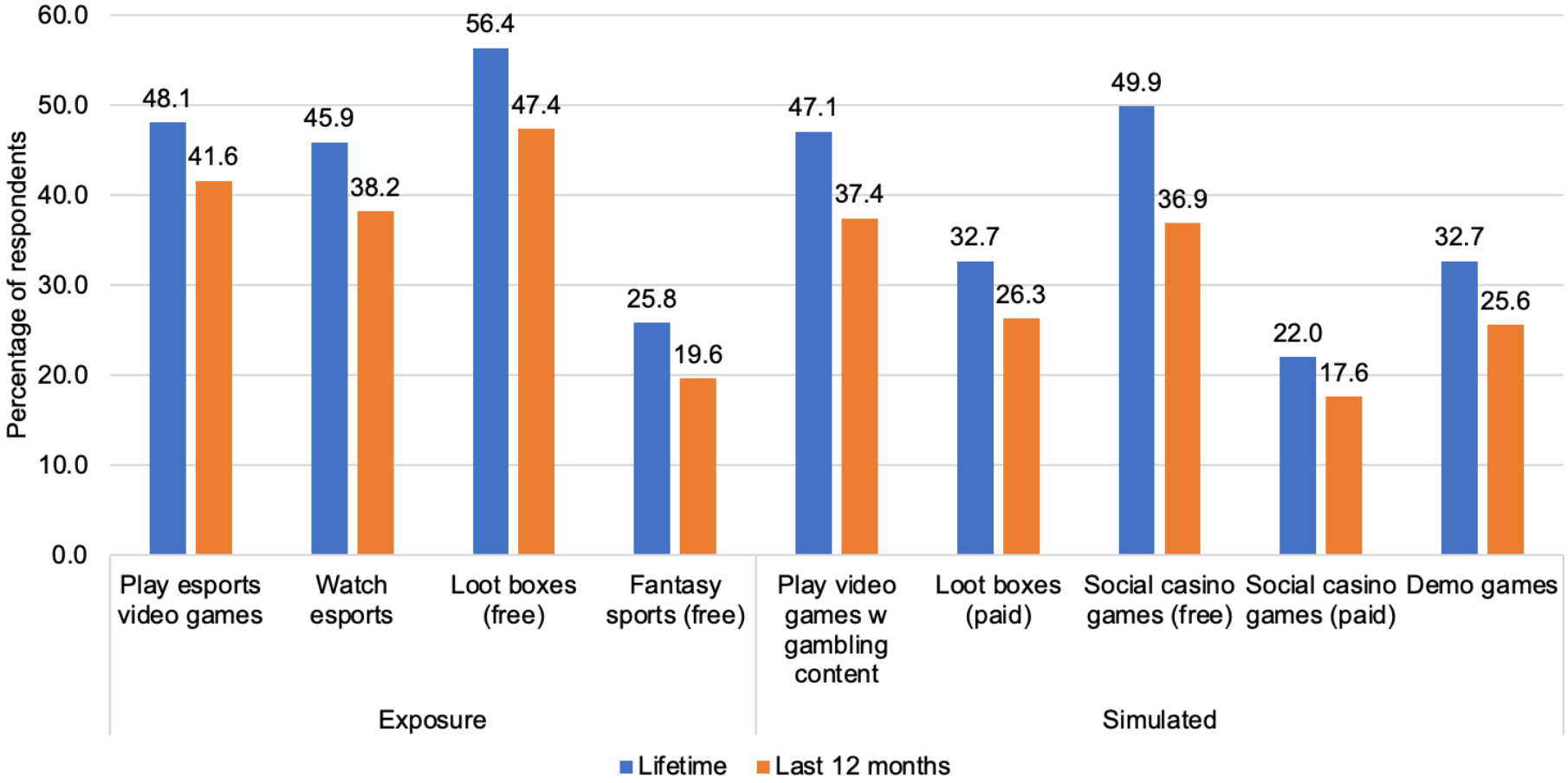

Figure 1 - Percentage of respondents taking part in each exposure and simulated form, during their lifetime and the last 12 months

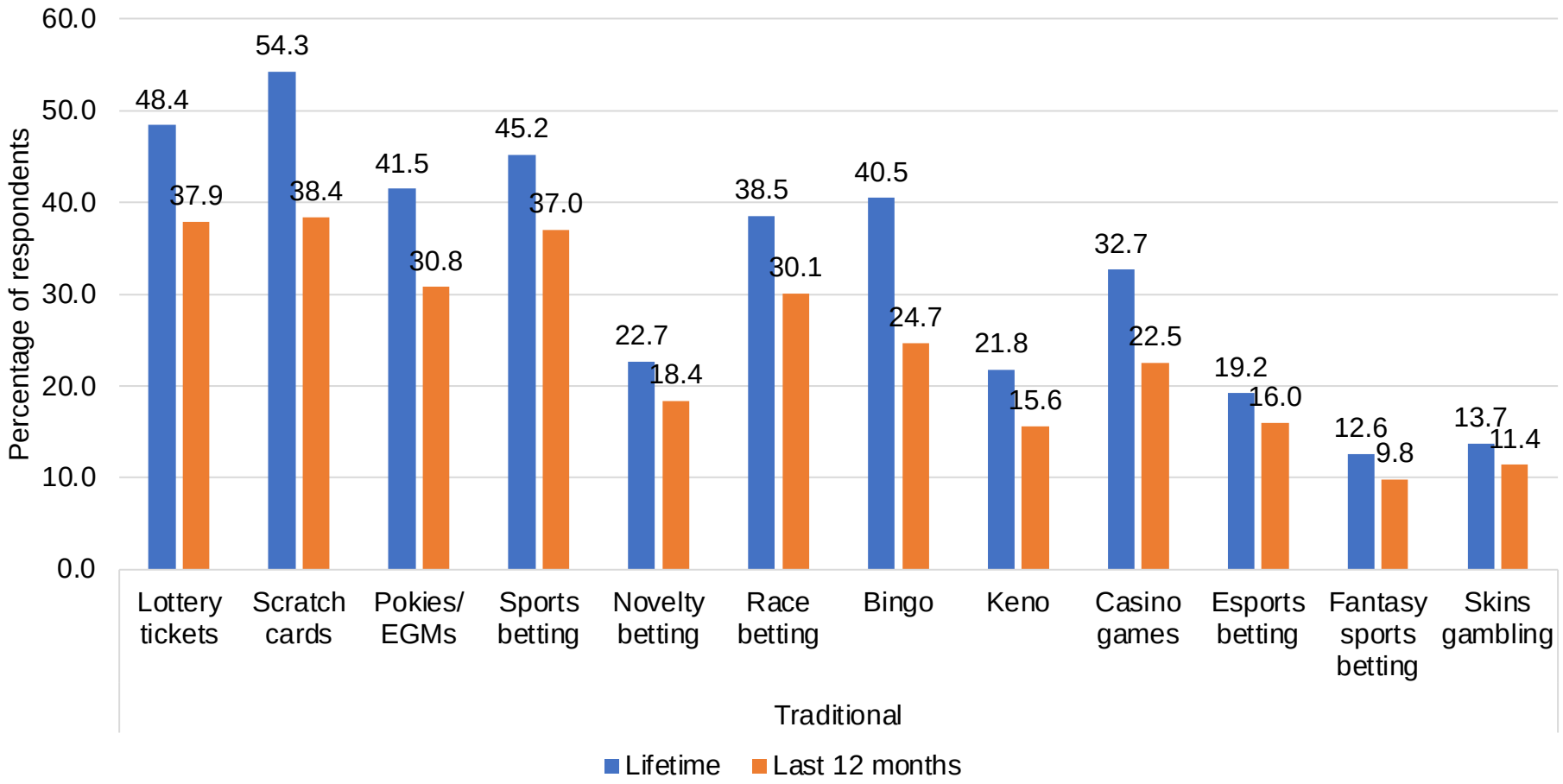

Figure 2 – Percentage of respondents taking part in each traditional form, during their lifetime and the last 12 months

Associations between exposure and simulated forms, and subsequent traditional gambling behaviour and harm

Associations between exposure, simulated and traditional gambling form engagement based on age when respondents first engaged in each form

The first research question asked whether playing games with gambling-related content (both exposure and simulated forms) is associated with subsequent gambling behaviour and gambling-related harm, including at any point during adolescence and young adulthood. We approached this question in two ways. First, we considered the age at which respondents reported first engaging in each activity and for each combination of simulated and traditional forms, to determine whether one was more likely to be done first (Table 4 to Table 7). Then we examined associations for use of exposure and simulated gambling forms (both at any point in their lifetime, as well as the last 12 months) and engagement in traditional gambling (lifetime or last 12 months), number of traditional gambling forms (last 12 months), gambling problems (lifetime or last 12 months) and gambling harm (last 12 months). Relationships between engagement with simulated gambling and gambling problems and harm were further explored in multivariate models (please see the later section in this chapter).

Understanding the temporal sequences of events can help to determine whether migration patterns are evident. It is important to note that while engagement in one form might be more likely to occur before another form, this does not necessarily mean that engagement in the first form *caused* engagement with the second form.

Table 4 shows how engagement with each form is associated with age, based on the age that respondents reported first and most recently engaging in each form[1]. Engagement with exposure forms, such as playing esports video games, opening free loot boxes and, to a lesser extent, watching esports, was more likely than other forms to happen before the age of 18[2]. The same was the case for some of the simulated forms, especially playing video games with gambling content, playing free-to-play social casino games, and, to a lesser extent, paying for loot boxes. For traditional gambling forms, scratch cards, bingo, and to a lesser extent lottery tickets, sports betting and race betting, may occur while

[1] This method assumes that respondents take part in each form in each year between the age they first and most recently took part. Further granularity of results would have required a much longer survey for respondents and was not feasible within the current study.

[2] None of the exposure or simulated forms of gambling were considered to be gambling at the time of data collection, and were therefore not legally restricted to those aged 18 or older. That is, there are no concerns that people were engaging with exposure or simulated forms under the age of 18. However, all traditional forms of gambling were legally restricted to those aged 18 or older.

under the age of 18 for some respondents, but most traditional forms appear to become more popular once a person reaches the age of 18[3].

Table 4 is based on the percentage of the total sample who reported taking part in each form at each age (allowing for the fact that there were fewer people at older ages). This means that the "heat" of each cell reflects more popular forms, with green indicating lower percentages, and red higher percentages. Table 5 is an alternate representation of the same data, which instead shows the percentage of respondents who had engaged with a given gambling form at a given age. Despite this alternative representation, Table 5 shows a similar pattern of results to Table 4. Additional information gained from Table 5 is that around 40% of those who took part in video games with gambling content, esports video games and opening free loot boxes did so before the age of 18. Further, around 40-60% of respondents reported taking part in traditional forms as soon as they turned 18, including scratch cards, pokies/EGMs, lottery tickets, keno, race betting, sports betting, casino games and bingo. A relatively small proportion of respondents reported taking part in these forms before turning 18.

[3] For traditional forms in particular, there is possibly a reporting bias because respondents may have been hesitant to report taking part in these forms while under the age of 18. Respondents were reminded at this point that the survey was anonymous, to reduce this bias.

Table 4 - Percentage of respondents who took part in each exposure, simulated and traditional form at each age (based on all respondents)

Forms		Age	<11	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
		N in each age	1026	1026	1026	1026	1026	1026	1026	1026	1026	928	830	687	558	451	326	195
		Lifetime N	% of all respondents engaged in each activity at each age															
Exposure	Play esports video games	493	3.5	3.1	5.7	7.6	10.2	15.0	18.8	20.0	24.9	23.9	26.1	26.6	27.4	24.6	25.5	23.1
	Watch esports	471	1.1	1.2	1.6	2.3	3.8	6.9	9.9	11.0	18.9	18.1	21.4	21.1	22.8	20.8	22.1	18.5
	Loot boxes (free)	579	3.5	3.2	5.3	7.6	11.6	16.4	20.6	21.4	28.8	27.4	28.7	27.7	31.9	32.2	30.7	24.6
	Fantasy sports (free)	265	1.0	0.6	0.7	1.4	2.3	3.4	4.9	5.0	8.6	8.1	10.4	10.0	10.2	9.3	7.7	7.2
Simulated	Play video games w gambling content	483	3.5	4.3	6.4	7.7	9.9	14.6	18.5	19.9	25.2	22.3	23.9	21.7	20.3	21.7	19.3	19.0
	Loot boxes (paid)	335	0.6	0.3	1.0	1.7	2.1	3.6	6.2	6.5	10.8	11.2	13.7	14.3	15.9	19.1	16.0	14.9
	Social casino games (free)	512	1.3	1.5	2.6	3.1	5.1	6.7	9.1	10.0	21.5	16.6	18.4	16.9	19.9	20.8	17.2	16.4
	Social casino games (paid)	226	0.3	0.0	0.2	0.4	0.3	0.5	0.8	1.4	6.0	6.3	6.6	8.0	8.2	7.8	8.9	8.2
	Demo games	335	0.7	0.3	0.4	0.4	0.8	1.8	3.1	3.6	10.8	10.0	10.8	11.9	12.7	10.9	10.1	10.3
Traditional	Lottery tickets	497	1.0	0.7	1.2	1.2	1.7	2.3	3.2	4.8	28.2	30.6	33.7	35.8	36.2	36.1	36.2	31.8
	Scratch cards	557	2.4	2.0	2.5	2.5	3.3	4.6	7.3	9.2	33.4	33.0	33.6	31.0	31.0	30.2	26.7	16.9
	Pokies/ EGMs	426	0.3	0.1	0.2	0.1	0.1	0.7	1.2	1.9	24.3	25.9	25.4	28.1	27.4	23.9	21.8	12.8
	Sports betting	464	0.7	0.5	0.7	0.8	1.1	1.9	3.4	4.4	19.1	21.1	25.1	24.0	26.3	26.2	29.8	23.1
	Novelty betting	233	0.2	0.2	0.2	0.4	0.4	0.6	0.9	1.1	5.6	7.0	8.8	8.2	9.1	8.9	11.7	10.8
	Race betting	395	0.9	0.8	1.1	1.5	1.9	2.7	3.7	4.1	16.5	18.9	20.0	20.4	23.3	21.7	23.6	19.5
	Bingo	416	2.4	1.6	2.7	2.6	3.4	4.8	6.6	6.4	16.2	13.6	15.8	14.1	14.7	12.4	12.9	9.7
	Keno	224	0.4	0.1	0.4	0.5	0.9	1.2	1.3	1.4	9.4	9.5	11.0	9.3	10.6	11.1	10.1	5.1
	Casino games	335	0.2	0.1	0.2	0.3	0.5	0.9	1.2	1.4	13.4	16.3	16.7	17.3	18.8	17.3	16.6	7.2
	Esports betting	197	0.4	0.2	0.4	0.5	0.7	0.7	1.8	1.9	5.5	6.1	7.2	8.9	9.5	9.3	9.2	8.7
	Fantasy sports betting	129	0.1	0.0	0.0	0.0	0.0	0.2	0.6	0.6	3.2	3.2	4.8	4.1	4.8	3.8	3.7	4.6
	Skins gambling	141	0.2	0.1	0.2	0.2	0.9	1.2	1.9	1.2	4.2	3.9	4.3	4.5	4.7	4.4	5.2	5.1

Note: green indicates lower percentages, red higher percentages.

Table 5 - Percentage of respondents who took part in each exposure, simulated and traditional form at each age (based on number of respondents who have engaged in each form)

Forms		Age	<11	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
		N in each age	1026	1026	1026	1026	1026	1026	1026	1026	1026	928	830	687	558	451	326	195
		Lifetime N	% of respondents who engage in that form, engaged at each age															
Exposure	Play esports video games	493	7.3	6.5	11.8	15.8	21.3	31.2	39.1	41.6	51.7	50.2	54.0	55.1	56.3	49.6	50.3	42.9
	Watch esports	471	2.3	2.5	3.4	5.1	8.3	15.1	21.7	24.0	41.2	39.2	46.2	45.6	50.0	44.1	45.9	36.0
	Loot boxes (free)	579	6.2	5.7	9.3	13.5	20.6	29.0	36.4	38.0	51.1	48.8	51.9	50.1	57.8	56.4	54.1	44.4
	Fantasy sports (free)	265	3.8	2.3	2.6	5.3	9.1	13.2	18.9	19.2	33.2	30.4	37.4	36.7	37.7	33.1	25.3	23.7
Simulated	Play video games w gambling content	483	7.5	9.1	13.7	16.4	21.1	31.1	39.3	42.2	53.6	47.2	50.5	46.0	44.5	46.7	41.2	41.6
	Loot boxes (paid)	335	1.8	0.9	3.0	5.1	6.6	11.0	19.1	20.0	33.1	32.8	39.3	40.0	46.1	51.2	41.6	39.2
	Social casino games (free)	512	2.5	2.9	5.3	6.3	10.2	13.5	18.2	20.1	43.2	33.0	36.6	32.6	38.5	39.8	33.1	32.3
	Social casino games (paid)	226	1.3	0.0	0.9	1.8	1.3	2.2	3.5	6.2	27.4	27.4	28.5	34.8	36.5	33.0	36.3	34.0
	Demo games	335	2.1	0.9	1.2	1.2	2.4	5.4	9.6	11.0	33.1	29.7	31.9	35.5	38.6	31.0	28.9	28.6
Traditional	Lottery tickets	497	2.0	1.4	2.4	2.4	3.4	4.8	6.6	9.9	58.1	60.4	64.4	66.5	66.0	63.4	61.5	50.8
	Scratch cards	557	4.5	3.8	4.7	4.7	6.1	8.4	13.5	16.9	61.6	59.5	59.5	53.4	52.1	48.4	43.1	27.0
	Pokies/ EGMs	426	0.7	0.2	0.5	0.2	0.2	1.6	2.8	4.7	58.5	58.5	54.9	57.8	54.3	46.4	41.8	25.5
	Sports betting	464	1.5	1.1	1.5	1.7	2.4	4.3	7.5	9.7	42.2	45.3	53.3	49.3	53.8	52.2	57.1	43.7
	Novelty betting	233	0.9	0.9	0.9	1.7	1.7	2.6	3.9	4.7	24.5	29.8	36.9	34.1	37.0	33.6	44.2	36.8
	Race betting	395	2.3	2.0	2.8	3.8	5.1	7.1	9.6	10.6	42.8	47.2	49.3	48.4	53.7	50.3	53.1	45.8
	Bingo	416	6.0	3.8	6.7	6.5	8.4	11.8	16.3	15.9	39.9	33.0	37.2	32.8	34.7	28.4	29.2	21.3
	Keno	224	1.8	0.4	1.8	2.2	4.0	5.4	5.8	6.3	42.9	41.9	46.4	38.1	42.8	45.0	40.7	20.8
	Casino games	335	0.6	0.3	0.6	0.9	1.5	2.7	3.6	4.2	40.9	46.6	45.6	44.9	46.9	43.3	40.9	17.1
	Esports betting	197	2.0	1.0	2.0	2.5	3.6	3.6	9.1	9.6	28.4	30.5	34.9	42.4	45.7	43.8	43.5	39.5
	Fantasy sports betting	129	0.8	0.0	0.0	0.0	0.0	1.6	4.7	4.7	25.6	24.0	34.5	27.7	33.3	25.4	23.1	29.0
	Skins gambling	141	1.4	0.7	1.4	1.4	6.4	8.5	13.5	8.5	30.5	27.7	31.0	31.6	33.3	30.8	37.0	35.7

Note: green indicates lower percentages, red higher percentages.

Temporal sequence between first taking part in each exposure or simulated form, and traditional gambling form

The temporal sequence of first taking part in exposure or simulated vs traditional forms was examined further. First, we compared the age that respondents reported first taking part in each exposure or simulated form to the age they reported first taking part in each traditional form. Non-parametric pairwise comparisons (Wilcoxon signed-rank tests) were used to determine if, on average, respondents were more likely to take part in either the exposure or simulated forms, or the traditional gambling forms first. Red cells indicate that the exposure or simulated form was significantly more likely to come first, while green cells indicate that the exposure or simulated form was significantly more likely to occur after the traditional form.

Table 6 shows the results. We provide an example interpretation for lottery tickets. The first age at which respondents bought lottery tickets was higher (i.e., later in life) than the age at which respondents first played esports video games, opened free loot boxes and played video games with gambling content. However, it was lower than the age at which respondents first bought loot boxes, played free or paid social casino games, and played demo games. White cells are not statistically significant. The relationship between lottery tickets and watching esports has a figure of .46, indicating that on average across the sample of those who took part in both these forms, watching esports occurred .46 of a year later than buying lottery tickets.

Table 6 shows that many of the exposure or simulated gambling forms were more likely to first occur at an earlier age than traditional gambling forms, particularly playing video games with gambling content, playing esports video games, opening free loot boxes, watching esports, and to a lesser extent free-to-play fantasy sports and free social casino games. However, some traditional forms were more likely to occur before simulated forms, notably buying lottery tickets, buying scratch cards and bingo. Paid social casino games and demo games were more likely to start at an older age. These results align with the findings from Tables 4 and 5, where the exposure or simulated forms that were most likely to precede traditional forms were fairly prevalent under the age of 18.

The figures in Table 6 indicate the average age difference between first taking part in each exposure or simulated form vs each traditional gambling form, averaged across those who took part in the two forms involved in each comparison. As can be seen, differences were approximately 0.4 to 1.7 years, on average.

As Table 4 and Table 5 show, respondents were likely to report first taking part in most exposure or simulated and almost all traditional gambling forms around the age of 18, indicating that many respondents might be starting two or more activities simultaneously. We therefore took an alternate approach in Table 7, where for each pair of forms (e.g., lottery tickets and watching esports), we considered only respondents for whom one of these forms occurred before the other. Interpreting the first line to explain the results shows that, of those who took part in both buying lottery tickets and watching esports, 41.5% were more likely to take part in buying lottery tickets before watching esports, and 14.4% took part in paid social casino games before buying lottery tickets, so green cells were more likely to come second. The red cells, for example, playing video games with gambling content, show that 57.4% of respondents who played video games with gambling

content and bought lottery tickets were more likely to play video games with gambling content first.

The figures in Table 7 indicate the percentage of people who took part in each exposure or simulated form *before* each traditional form. Red cells indicate that a significantly higher proportion of people who engaged in both forms in a pair took part in the exposure or simulated form first, and green cells indicate a higher proportion of people who took part in the traditional form first. As can be seen from comparing Table 6 and Table 7, while some differences might be expected, the results are generally very similar from the two approaches.

Table 6 - Difference between mean age of first taking part in each exposure or simulated form, and traditional gambling form

	Exposure				Simulated				
Forms	**Play esports video games**	**Watch esports**	**Loot boxes (free)**	**Fantasy sports (free)**	**Play video games with gambling content**	**Loot boxes (paid)**	**Social casino games (free)**	**Social casino games (paid)**	**Demo games**
Lottery tickets	-0.56*	0.46*	-0.43*	0.46	-0.46*	0.79***	0.44*	1.69***	1.21***
Scratch cards	-0.50*	0.69***	-0.38*	0.41	-0.52**	0.93***	0.51**	1.56***	1.27***
Pokies/ EGMs	-1.17***	0.08	-0.87***	-0.12	-0.97***	0.03	0.11	0.95***	0.56**
Sports betting	-1.61***	-0.27	-1.19***	-0.22	-1.07***	-0.42*	-0.24	0.76***	0.36*
Novelty betting	-1.54***	-0.81***	-1.22***	-0.93**	-1.22***	-0.90***	-0.79***	0.07	-0.27
Race betting	-1.43***	-0.51*	-1.36***	-0.36	-1.14***	-0.35	-0.26	0.55**	0.16
Bingo	-0.79***	0.39	-0.54**	0.04	-0.22	0.22	0.54**	1.22***	1.16***
Keno	-1.11***	-0.36	-0.92**	-0.16	-0.93***	-0.09	0.13	0.36	0.20
Casino games	-1.66***	-0.40*	-1.38***	-0.66**	-1.37***	-0.57**	-0.30	0.46*	0.17
Esports betting	-1.57***	-0.90***	-0.87***	-0.41	-0.78***	-0.55**	-0.11	0.30	-0.01
Fantasy sports betting	-1.46***	-0.76**	-0.76**	-0.67**	-0.96***	-0.68**	-0.25	0.07	-0.06
Skins gambling	-1.67***	-0.56*	-0.69**	-0.19	-0.62**	-0.56*	-0.10	0.27	0.05

Note: Some cells have low cell counts, especially in the lower right of the table, and are therefore underpowered. Negative numbers indicate that the exposure or simulated form, on average, started before the traditional form. Green cells indicate that the traditional gambling form was significantly more likely to come first, while red cells indicate that the exposure or simulated gambling form was significantly more likely to come first. Tests are Wilcoxon signed-rank tests, mean values were inflated by outliers, and medians were uninformative, so reported mean differences are trimmed at -6 and 6 years difference. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 7 - Percentage of people who first engaged in each exposure or simulated form before each traditional form, amongst people who engaged in both and who did not first engage in each pair simultaneously

	Exposure				Simulated				
Forms	**Play esports video games**	**Watch esports**	**Loot boxes (free)**	**Fantasy sports (free)**	**Play video games with gambling content**	**Loot boxes (paid)**	**Social casino games (free)**	**Social casino games (paid)**	**Demo games**
Lottery tickets	52.5	41.5*	54.7	39.5*	57.4*	35.9**	42.6*	14.4***	25.7***
Scratch cards	53.7	36.8***	56.0	39.8*	57.3*	35.5***	40.4**	17.4***	23.3***
Pokies/ EGMs	68.0***	49.3	64.7***	49.5	65.0***	48.5	45.8	23.1***	35.7**
Sports betting	73.5***	54.0	66.4***	51.9	62.2***	57.0	51.7	30.0***	38.9**
Novelty betting	78.7***	66.7**	68.4***	62.7*	71.4***	71.1***	66.0**	47.0	54.2
Race betting	73.1***	58.7*	69.0***	54.5	68.2***	53.0	53.3	38.5*	47.9
Bingo	64.8***	50.3	60.8**	48.4	54.3	49.2	41.4*	26.9***	32.3***
Keno	69.6***	59.3	63.8**	49.1	68.6**	55.2	48.3	42.3	43.8
Casino games	73.3***	58.9*	73.8***	58.2	71.2***	61.2*	60.1*	38.7	47.0
Esports betting	84.6***	76.0***	70.1***	58.2	71.3***	68.4**	50.0	43.9	54.0
Fantasy sports betting	86.7***	66.1*	64.7*	61.5	69.8**	68.2*	55.8	50.0	55.1
Skins gambling	87.0***	59.4	71.2**	47.6	62.1*	65.5*	49.1	41.9	47.1

Note: Some cells have low cell counts, especially in the lower right of the table, and are therefore underpowered. Green cells indicate that the traditional gambling form was more likely to come first, while red cells indicate that the exposure or simulated gambling form was more likely to come first. Tests are chi-square goodness of fit tests. * $p < .05$, ** $p < .01$, *** $p < .001$

Temporal sequence between most frequently taking part in each exposure or simulated form, and traditional gambling form

It is plausible that respondents might have started one activity before another, but then to have become more heavily engaged in the latter activity first. That is, age of onset might not appropriately capture the actual relationship of which form preceded the other. We therefore conducted the same analyses using the age at which respondents reported that they most *frequently* took part in each form. Tables showing proportion of the sample that most frequently took part in each form at each age could not be calculated due to varying numbers of data points above the age of 18. This is because all respondents had data for age 18, but not age 25 for example, because not all respondents were 25. However, the same temporal associations as above were conducted between when respondents were most frequently engaged in each exposure or simulated form and each traditional form, both in terms of the proportion of respondents who did one before the other, and the mean age difference in terms of most frequent engagement in each form. While some specific results differ to those for first age, the overall picture from the results is similar.

Interpreting the second line of Table 8 (scratch cards) as a demonstration, we can see that playing video games with gambling content, a red cell, was more likely to occur most frequently at a younger age than most frequent engagement in buying scratch cards. Alternatively, the green cells (watch esports, paid social casino games, demo games) indicate simulated forms that occurred most frequently *after* the most frequency engagement in scratch tickets. White cells are not statistically significant.

Wilcoxon signed-rank tests, shown in Table 8, indicate that respondents most frequently took part in some exposure forms (playing esports video games, opening free loot boxes, playing free fantasy sports) and some simulated forms (playing video games with gambling content, paying for loot boxes, and playing free social casino games) most frequently before the most frequent engagement in some traditional gambling forms. It is important to note that the specific traditional gambling forms associated with these results differ by exposure or simulated gambling form, and that notable exceptions were scratch cards and bingo, which tended to precede exposure or simulated gambling forms. In general, and apart from these exceptions, not only does *first* engagement with these exposure or simulated forms tend to precede first engagement with traditional gambling forms, so too does most frequent engagement. These differences were, on average, between 0.5 and 1 year.

A similar pattern was observed for the proportion of respondents who most frequently engaged in exposure or simulated forms before traditional forms (Table 9). Interpreting the scratch cards line again, for 58.2% of respondents, scratch cards came after playing video games with gambling content, but most frequent engagement in scratch cards came before paid loot boxes (40.8% of respondents did loot boxes first), after paid social casino games, and after demo games. White cells are not statistically significant.

Table 8 - Difference between mean age of most frequently taking part in each exposure or simulated form, and traditional gambling form

	Exposure				Simulated				
Forms	**Play esports video games**	**Watch esports**	**Loot boxes (free)**	**Fantasy sports (free)**	**Play video games with gambling content**	**Loot boxes (paid)**	**Social casino games (free)**	**Social casino games (paid)**	**Demo games**
Lottery tickets	-0.31	0.08	-0.28	-0.43	-0.59***	0.02	-0.37*	0.28	0.07
Scratch cards	0.11	0.37*	-0.15	0.11	-0.38*	0.36	-0.06	0.74***	0.47**
Pokies/ EGMs	-0.18	0.16	-0.16	-0.18	-0.61***	0.12	-0.14	0.31	0.16
Sports betting	-0.80***	-0.14	-0.65***	-0.51*	-0.81***	-0.38	-0.65***	0.21	-0.09
Novelty betting	-0.56**	-0.37*	-0.39*	-0.84**	-0.63**	-0.54*	-0.49**	0.04	-0.13
Race betting	-0.77***	-0.29	-0.72***	-0.71***	-0.79***	-0.36	-0.64***	-0.08	-0.18
Bingo	0.13	0.58**	0.15	0.18	0.16	0.36	0.44**	0.99***	0.99***
Keno	-0.32	-0.31	-0.30	-0.29	-0.51*	-0.20	-0.30	-0.01	0.07
Casino games	-0.34*	-0.12	-0.42*	-0.25	-0.69***	-0.38	-0.35*	0.14	0.15
Esports betting	-0.49***	-0.18	-0.27	-0.45*	-0.24	-0.22	-0.06	0.29	0.02
Fantasy sports betting	-0.42*	-0.18	-0.24	-0.24	-0.43	-0.25	-0.12	0.12	0.15
Skins gambling	-0.50*	0.03	0.20	-0.13	0.03	-0.07	0.33	0.22	0.26

Note: Some cells have low cell counts, especially in the lower right of the table, and are therefore underpowered. Negative numbers indicate that the exposure or simulated form, on average, started before the traditional form. Green cells indicate that most frequent engagement with the traditional gambling form was significantly more likely to come first, while red cells indicate that most frequent engagement with the exposure or simulated gambling form was significantly more likely to come first. Tests are Wilcoxon signed-rank tests, mean values were inflated by outliers, and medians were uninformative, so reported mean differences are trimmed at -6 and 6 years difference. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 9 - Percentage of people who engaged in each exposure or simulated form most frequently before each traditional form, amongst people who engaged in both and who were not most frequently engaged in each pair simultaneously

	Exposure				Simulated				
Forms	**Play esports video games**	**Watch esports**	**Loot boxes (free)**	**Fantasy sports (free)**	**Play video games with gambling content**	**Loot boxes (paid)**	**Social casino games (free)**	**Social casino games (paid)**	**Demo games**
Lottery tickets	56.0	48.8	54.3	54.6	63.7***	45.0	57.6*	40.0	48.8
Scratch cards	49.2	42.8	54.2	45.1	58.2*	40.8*	47.5	28.9***	33.1***
Pokies/ EGMs	52.1	46.9	53.1	54.7	61.4**	45.3	52.9	41.6	49.2
Sports betting	66.0***	51.9	63.2***	52.4	63.5***	53.4	61.8**	43.8	54.0
Novelty betting	63.0**	61.3*	59.4	60.9	61.3*	62.0*	61.5*	49.2	52.8
Race betting	66.7***	57.0	64.6***	60.0	67.4***	51.4	66.7***	49.4	56.5
Bingo	46.2	41.2*	49.5	42.4	49.7	43.2	40.2**	28.1***	29.3***
Keno	57.7	52.1	52.7	51.9	59.3	52.4	54.7	47.1	44.3
Casino games	55.7	50.4	56.1	50.5	62.8**	52.1	60.7**	48.6	47.9
Esports betting	67.9***	61.2*	61.7*	55.9	61.5*	58.7	53.2	43.5	51.5
Fantasy sports betting	66.7*	55.3	54.2	54.2	63.0	57.5	50.9	48.4	47.8
Skins gambling	63.9*	48.4	42.6	45.0	43.5	48.4	35.3*	44.4	40.8

Note: Some cells have low cell counts, especially in the lower right of the table, and are therefore underpowered. Green cells indicate that most frequent engagement in the traditional gambling form was more likely to come first, while red cells indicate that most frequent engagement in the exposure or simulated gambling form was more likely to come first. Tests are chi-square goodness of fit tests. * $p < .05$, ** $p < .01$, *** $p < .001$

Associations between engagement in each exposure or simulated form, and engagement in traditional gambling (in general), as well as traditional gambling problems and harms

We tested for relationships between engagement in each simulated form and a range of traditional gambling outcomes. Engagement in simulated gambling was considered for each form, both within the lifetime, and within the last 12 months. The traditional gambling outcomes were engagement in traditional gambling, either in the lifetime or in the last 12 months. For those who engaged in the last 12 months, an additional traditional gambling outcomes was how engaged they were, as measured by how many traditional gambling forms they took part in. Finally, traditional gambling outcomes also included gambling problems, both in the lifetime and in the last 12 months, and gambling harm in the last 12 months. These associations were tested using either bivariate logistic or linear regressions.

Table 10 shows the associations between lifetime use of each exposure form and each simulated gambling form and these traditional gambling outcomes; engagement, problems and harm. We interpret the first line as an example. People who played esports video games were significantly more likely to take part in traditional gambling at some point in their life, and also take part in traditional gambling within the last 12 months. Further, amongst those who took part in traditional gambling in the last 12 months, those who played esports video games were more engaged traditional gamblers, in terms of the number of forms they took part in. Playing esports video games was also associated with higher levels of gambling problems in the last 12 months, gambling harm in the last 12 months, and gambling problems in the lifetime.

People who engaged in any of the exposure or simulated forms were more likely to experience almost all of the outcomes, although free loot boxes were associated with fewer outcomes. Importantly, associations do not equal causation, and these findings only show that people who engaged in these forms were also more likely to gamble and experience gambling problems or harm.

Table 11 examines associations between engagement with exposure forms and simulated forms in the last 12 months, with traditional gambling engagement, problems and harm. The outcome variables were only considered for the last 12 months, rather than lifetime, as it did not make sense to examine current use of simulated gambling and historical gambling problems (for example). Use of all of the exposure and simulated forms in the last 12 months was associated with use of any traditional gambling form in the last 12 months. Three of the exposure forms and three of the simulated forms were associated with number of traditional forms engaged in in the last 12 months. Similarly, two exposure forms and four simulated forms were associated with gambling problems in the last 12 months, and with gambling harm in the last 12 months.

Taken together, the results related to use of exposure or simulated gambling forms at any point in the lifetime (Tables 10 and 11) show significant associations with traditional gambling engagement and harm.

However, the associations are strongest for the forms that started *after* traditional gambling forms. For example, the coefficients in Table 10 and Table 11 that are the largest and have the strongest associations are for simulated forms such as paid social casino

games and demo games. Examining Table 4 and Table 5 shows that these forms are more likely to be started *after* the first engagement in traditional gambling forms. Together, these results do not suggest a migration from these forms of simulated gambling to traditional gambling, and then to gambling-related harm. Instead, they suggest that these simulated products appeal to people who are the most likely to take part in traditional gambling and experience gambling harm. One of the exposure forms that typically *precedes* traditional gambling (free loot boxes) was associated with traditional gambling engagement, problems and harm, but these were some of the weakest associations, and some were not statistically significant.

Table 10 – Associations between engagement with exposure or simulated gambling forms (lifetime) and engagement in traditional gambling, gambling problems and gambling harm

		Traditional gambling					
Dependent variable		**Any forms (lifetime)**	**Any form at least monthly (last 12 mths)**	**Number of forms at least monthly (last 12 mths)**	**Gambling problems score (last 12 mths)**	**Gambling harm score (last 12 mths)**	**Gambling problems (lifetime)**
Regression type		*Logistic*	*Logistic*	*Linear*	*Linear*	*Linear*	*Logistic*
N		*1026*	*1026*	*484*	*402*	*402*	*883*
Exposure	Play esports video games	1.746*** (1.212; 2.516)	2.456*** (1.910; 3.157)	0.500*** (0.323; 0.676)	0.524*** (0.333; 0.714)	0.393*** (0.200; 0.586)	2.410*** (1.839; 3.158)
	Watch esports	1.425 (0.993; 2.047)	2.248*** (1.749; 2.888)	0.482*** (0.307; 0.657)	0.652*** (0.466; 0.838)	0.540*** (0.351; 0.729)	2.149*** (1.641; 2.813)
	Loot boxes (free)	1.330 (0.933; 1.894)	1.330* (1.038; 1.704)	0.349*** (0.169; 0.529)	0.128 (-0.071; 0.327)	0.172 (-0.026; 0.371)	1.372* (1.050; 1.793)
	Fantasy sports (free)	2.362*** (1.440; 3.874)	3.411*** (2.531; 4.596)	0.705*** (0.531; 0.878)	0.666*** (0.468; 0.865)	0.580*** (0.379; 0.781)	2.357*** (1.734; 3.204)
Simulated	Play video games with gambling content	2.593*** (1.758; 3.822)	2.183*** (1.700; 2.803)	0.513*** (0.338; 0.688)	0.299** (0.104; 0.493)	0.185 (-0.011; 0.380)	1.752*** (1.342; 2.287)
	Loot boxes (paid)	2.554*** (1.623; 4.017)	2.706*** (2.066; 3.544)	0.595*** (0.423; 0.767)	0.471*** (0.274; 0.668)	0.396*** (0.197; 0.594)	1.932*** (1.458; 2.561)
	Social casino games (free)	3.335*** (2.243; 4.961)	1.987*** (1.550; 2.549)	0.474*** (0.297; 0.651)	0.296** (0.101; 0.490)	0.352*** (0.158; 0.545)	1.746*** (1.337; 2.281)
	Social casino games (paid)	7.577*** (3.299; 17.403)	5.623*** (3.983; 7.938)	0.926*** (0.759; 1.092)	0.898*** (0.706; 1.089)	0.716*** (0.517; 0.914)	2.875*** (2.075; 3.985)
	Demo games	4.850*** (2.792; 8.425)	4.628*** (3.483; 6.149)	0.732*** (0.566; 0.899)	0.761*** (0.576; 0.945)	0.611*** (0.421; 0.800)	2.498*** (1.879; 3.319)

Note: Coefficients for logistic regressions are odds ratios (null value = 1), and for linear regressions are standardised coefficients (null value = 0). Values in brackets are 95% confidence intervals. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 11 – Associations between engagement with exposure or simulated gambling forms (last 12 months) and engagement in traditional gambling, gambling problems and gambling harm

		Traditional gambling			
Dependent variable		**Any form at least monthly (last 12 mths)**	**Number of forms at least monthly (last 12 mths)**	**Gambling problems score (last 12 mths)**	**Gambling harm score (last 12 mths)**
Regression type		*Logistic*	*Linear*	*Linear*	*Linear*
Exposure	Play esports video games	2.294** (1.353; 3.889)	0.347 (-0.092; 0.786)	0.287 (-0.174; 0.748)	0.704** (0.196; 1.211)
	Watch esports	3.036*** (1.833; 5.027)	0.617** (0.197; 1.038)	0.322 (-0.078; 0.722)	0.396 (-0.083; 0.874)
	Loot boxes (free)	2.436*** (1.523; 3.897)	0.485* (0.072; 0.898)	0.455* (0.008; 0.902)	0.489* (0.031; 0.947)
	Fantasy sports (free)	3.612*** (2.006; 6.506)	0.518* (0.059; 0.977)	0.577* (0.063; 1.091)	0.345 (-0.270; 0.959)
Simulated	Play video games with gambling content	2.508*** (1.595; 3.944)	0.445* (0.065; 0.826)	0.334 (-0.056; 0.724)	0.370 (-0.048; 0.788)
	Loot boxes (paid)	2.268** (1.310; 3.929)	0.334 (-0.110; 0.777)	0.854*** (0.409; 1.299)	0.905*** (0.411; 1.400)
	Social casino games (free)	4.678*** (3.039; 7.202)	0.584** (0.231; 0.937)	0.787*** (0.382; 1.192)	0.710** (0.259; 1.161)
	Social casino games (paid)	4.586*** (2.260; 9.306)	0.349 (-0.127; 0.825)	0.447* (0.055; 0.838)	0.792** (0.255; 1.328)
	Demo games	6.017*** (3.436; 10.536)	0.834*** (0.408; 1.261)	0.802*** (0.368; 1.236)	0.828** (0.290; 1.366)

Note: Coefficients for logistic regressions are odds ratios (null value = 1), and for linear regressions are standardised coefficients (null value = 0). Values in brackets are 95% confidence intervals. * $p < .05$, ** $p < .01$, *** $p < .001$. Note that Ns vary depending on number of respondents who engaged in each form in their lifetime.

Associations between parental factors and gambling engagement and harm

The second research question asked whether certain types of parenting styles (e.g., involvement, connectedness, hostility) or other parental factors related to adolescent games with gambling-like content (e.g., supervision, norms), were associated with greater (or lower) risk of subsequent gambling engagement and gambling-related harm.

Table 12 shows bivariate associations between parental variables (supervision, norms, nature of parent-adolescent relationship) and simulated gambling outcomes. These outcomes include engagement in simulated gambling in the lifetime, as well as at least monthly engagement during the previous 12 months, and how many simulated gambling forms they engaged in during the last 12 months. Gaming problems (both as a scale and as a no/yes variable) were also included as outcomes, although it is important to note that gaming problems may refer to problems associated with games that are not simulated gambling. We interpret the first line to demonstrate the meaning of the results. Those whose parents restricted their gaming when growing up were more likely to experience gaming problems in the last 12 months, based on both the gaming problems score, and whether or not their score met classification of experiencing gaming problems. However, no significant association was found with simulated gambling engagement during the lifetime or last 12 months, nor the number of simulated gambling forms they had engaged in during the last 12 months (white cells).

This table shows that a parent-adolescent relationship that involves hostility is associated with a greater likelihood of use of simulated gambling forms, as well as experiencing gaming problems. Connectedness and involvement were not significantly associated with any simulated gambling outcomes. Further, all parental norms (both perceived approval [injunctive] and perceived parental behaviour [descriptive], and in relation to both simulated and traditional gambling) were associated with all simulated gambling outcomes. These results indicate that respondents who thought their parents approved of simulated and/or traditional gambling activities, or whose parents took part in them, were more likely to engage in simulated gambling. Parental restriction in relation to video games was associated with experiencing problems in relation to gaming.

Table 13 shows the same predictors, but in relation to traditional gambling outcomes. The results are similar. A hostile parenting style was associated with higher levels of gambling and gambling problems, as were parental norms (both injunctive and descriptive, and both in relation to simulated and traditional gambling forms). Parental restriction of gaming was also associated with two outcomes (number of traditional forms used at least monthly in the last 12 months, and gambling harm experienced in the last 12 months). Involvement and connectedness were not significantly associated with any traditional gambling outcomes.

These outcomes are simple bivariate relationships and do not take into account any other possible variables. These results are therefore explored in further detail in the multivariate analysis section, below.

Table 12 – Bivariate associations between parental variables and simulated gambling outcomes

	Simulated gambling				
Dependent variable	**SG use (lifetime)**	**SG use at least monthly (last 12 mths)**	**Number of SG forms at least monthly (last 12 mths)**	**Gaming problems score (last 12 mths)**	**Gaming problems no vs yes (last 12 mths)**
Regression type	*Logistic*	*Logistic*	*Linear*	*Linear*	*Logistic*
N	*1026*	*1026*	*504*	*1026*	*1026*
Parental restriction of gaming when growing up	1.048 (0.936; 1.173)	1.050 (0.950; 1.161)	0.049 (-0.022; 0.120)	0.084* (0.004; 0.165)	1.311** (1.097; 1.566)
Parenting - involvement	0.999 (0.970; 1.029)	0.981 (0.956; 1.007)	0.011 (-0.060; 0.083)	-0.001 (-0.084; 0.083)	1.001 (0.959; 1.045)
Parenting - connectedness	0.998 (0.980; 1.016)	0.990 (0.974; 1.005)	0.010 (-0.062; 0.081)	-0.010 (-0.092; 0.072)	0.993 (0.967; 1.019)
Parenting - hostility	1.065** (1.037; 1.093)	1.059*** (1.035; 1.083)	0.193*** (0.122; 0.263)	0.269*** (0.191; 0.347)	1.127*** (1.085; 1.171)
Parents - injunctive norms, traditional gambling	1.021* (1.005; 1.037)	1.046*** (1.032; 1.060)	0.296*** (0.231; 0.361)	0.219*** (0.148; 0.290)	1.058*** (1.040; 1.076)
Parents - descriptive norms, traditional gambling	1.036*** (1.020; 1.052)	1.048*** (1.036; 1.061)	0.277*** (0.212; 0.342)	0.200*** (0.131; 0.269)	1.046*** (1.030; 1.063)
Parents - injunctive norms, simulated gambling	1.036*** (1.019; 1.054)	1.069*** (1.054; 1.085)	0.378*** (0.316; 0.439)	0.242*** (0.174; 0.311)	1.062*** (1.044; 1.079)
Parents - descriptive norms, simulated gambling	1.040** (1.021; 1.059)	1.074*** (1.058; 1.091)	0.386*** (0.324; 0.447)	0.268*** (0.202; 0.335)	1.072*** (1.053; 1.090)

Note: Coefficients for logistic regressions are odds ratios (null value = 1), and for linear regressions are standardised coefficients (null value = 0). Values in brackets are 95% confidence intervals. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 13 – Bivariate associations between parental variables and traditional gambling outcomes

	Traditional gambling					
Dependent variable	**Any forms (lifetime)**	**Any form at least monthly (last 12 mths)**	**Number of forms at least monthly (last 12 mths)**	**Gambling problems score (last 12 mths)**	**Gambling harm score (last 12 mths)**	**Gambling problems (lifetime)**
Regression type	*Logistic*	*Logistic*	*Linear*	*Linear*	*Linear*	*Logistic*
N	*1026*	*1026*	*484*	*402*	*402*	*883*
Parental restriction of gaming when growing up	1.122 (0.975; 1.292)	1.032 (0.935; 1.139)	0.141** (0.047; 0.235)	0.046 (-0.057; 0.149)	0.158** (0.056; 0.260)	1.071 (0.962; 1.193)
Parenting - involvement	1.006 (0.970; 1.044)	1.010 (0.985; 1.036)	0.037 (-0.054; 0.128)	-0.050 (-0.148; 0.048)	-0.036 (-0.134; 0.062)	0.988 (0.961; 1.016)
Parenting - connectedness	1.016 (0.993; 1.039)	1.008 (0.992; 1.024)	0.020 (-0.074; 0.115)	-0.017 (-0.118; 0.083)	-0.018 (-0.118; 0.082)	0.991 (0.974; 1.008)
Parenting - hostility	1.021 (0.989; 1.054)	1.049*** (1.026; 1.072)	0.201*** (0.114; 0.288)	0.279*** (0.188; 0.370)	0.267*** (0.175; 0.358)	1.063*** (1.038; 1.089)
Parents - injunctive norms, traditional gambling	1.123*** (1.083; 1.164)	1.060*** (1.045; 1.076)	0.287*** (0.212; 0.362)	0.311*** (0.228; 0.394)	0.269*** (0.184; 0.353)	1.027*** (1.013; 1.041)
Parents - descriptive norms, traditional gambling	1.098*** (1.066; 1.132)	1.058*** (1.045; 1.072)	0.271*** (0.194; 0.348)	0.333*** (0.251; 0.414)	0.292*** (0.209; 0.375)	1.036*** (1.023; 1.049)
Parents - injunctive norms, simulated gambling	1.067*** (1.038; 1.096)	1.066*** (1.050; 1.082)	0.319*** (0.246; 0.391)	0.417*** (0.339; 0.495)	0.306*** (0.223; 0.389)	1.051*** (1.035; 1.066)
Parents - descriptive norms, simulated gambling	1.061*** (1.032; 1.091)	1.081*** (1.063; 1.099)	0.337*** (0.266; 0.407)	0.433*** (0.362; 0.504)	0.346*** (0.270; 0.422)	1.070*** (1.052; 1.088)

Note: Coefficients for logistic regressions are odds ratios (null value = 1), and for linear regressions are standardised coefficients (null value = 0). Values in brackets are 95% confidence intervals. PGSI was log-transformed. * $p < .05$, ** $p < .01$, *** $p < .001$

Associations between gaming motivations and competing social influences on engagement with simulated gambling, traditional gambling and gambling-related harm

Four gaming motivations were considered: enhancement, social, coping and self-gratification. As can be seen in Table 14 and Table 15, people who endorsed all four motivations were more likely to report all simulated gambling outcomes (lifetime engagement, last 12 months engagement, gambling problems), as well as almost all traditional gambling outcomes (last 12 months engagement, gambling problems during the lifetime, gambling problems in the last 12 months, and gambling harm in the last 12 months). Engagement in traditional gambling in the lifetime was associated with social and self-gratification, but not enhancement or coping motivations. Examination of the coefficients and confidence intervals showed that self-gratification was generally the strongest predictor of most outcomes, but coefficients for the four motivations were not statistically significantly different for most outcomes.

Both injunctive (perceived approval) and descriptive (perceived engagement) norms were assessed for friends, parents and other family in relation to simulated gambling. Like the motivations, these different norm variables were correlated with each other, and there was also substantial overlap in the results. Higher normative values, from any source (friends, parents, other family), or any type (injunctive [perceived approval] or descriptive [perceived engagement]) were all associated with every simulated and traditional gambling outcome.

Norms were also considered in one other way: through the amount of friends who engage in simulated gambling. Like the injunctive and descriptive norms above, people who had more friends who took part in simulated gambling were also more likely to take part in simulated gambling themselves, and to experience gaming problems. They were also more likely to take part in traditional gambling and experience problems or harm from traditional gambling.

These are all bivariate results, meaning that they do not take into account any other variables. Please see the multivariate analyses below for analyses that do control for other known predictors.

Table 14 – Bivariate associations between normative variables and simulated gambling outcomes

	Simulated gambling				
Dependent variable	**SG use (lifetime)**	**SG use at least monthly (last 12 mths)**	**Number of SG forms (last 12 mths)**	**Gaming problems score (last 12 mths)**	**Gaming problems no vs yes (last 12 mths)**
Regression type	Logistic	Logistic	Linear	Linear	Logistic
N	1026	1026	504	1026	1026
Amount of friends who engage in simulated gambling	3.307*** (2.548; 4.291)	3.522*** (2.817; 4.403)	0.344*** (0.275; 0.413)	0.258*** (0.183; 0.332)	2.337*** (1.752; 3.118)
Friends - injunctive norms, simulated gambling	1.065*** (1.046; 1.085)	1.075*** (1.060; 1.090)	0.375*** (0.314; 0.436)	0.294*** (0.227; 0.362)	1.064*** (1.048; 1.081)
Parents - injunctive norms, simulated gambling	1.036*** (1.019; 1.054)	1.069*** (1.054; 1.085)	0.378*** (0.316; 0.439)	0.242*** (0.174; 0.311)	1.062*** (1.044; 1.079)
Family - injunctive norms, simulated gambling	1.041*** (1.022; 1.060)	1.076*** (1.059; 1.092)	0.408*** (0.347; 0.468)	0.271*** (0.205; 0.337)	1.064*** (1.047; 1.081)
Friends - descriptive norms, simulated gambling	1.073*** (1.052; 1.094)	1.081*** (1.065; 1.096)	0.355*** (0.293; 0.417)	0.321*** (0.254; 0.389)	1.070*** (1.053; 1.087)
Parents - descriptive norms, simulated gambling	1.040** (1.021; 1.059)	1.074*** (1.058; 1.091)	0.386*** (0.324; 0.447)	0.268*** (0.202; 0.335)	1.072*** (1.053; 1.090)
Family - descriptive norms, simulated gambling	1.051*** (1.031; 1.071)	1.079*** (1.063; 1.096)	0.405*** (0.345; 0.465)	0.297*** (0.231; 0.363)	1.064*** (1.046; 1.081)
Gaming motivations - enhancement	1.247*** (1.179; 1.319)	1.240*** (1.180; 1.304)	0.192*** (0.119; 0.265)	0.201*** (0.114; 0.289)	1.285*** (1.179; 1.401)
Gaming motivations - social	1.269*** (1.195; 1.347)	1.334*** (1.267; 1.405)	0.340*** (0.273; 0.406)	0.280*** (0.203; 0.356)	1.351*** (1.247; 1.464)
Gaming motivations - coping	1.186*** (1.135; 1.240)	1.209*** (1.164; 1.256)	0.282*** (0.213; 0.350)	0.304*** (0.222; 0.386)	1.256*** (1.179; 1.338)
Gaming motivations - self-gratification	1.229*** (1.168; 1.293)	1.387*** (1.324; 1.454)	0.479*** (0.417; 0.541)	0.402*** (0.327; 0.477)	1.338*** (1.253; 1.428)

Note: Coefficients for logistic regressions are odds ratios (null value = 1), and for linear regressions are standardised coefficients (null value = 0). Values in brackets are 95% confidence intervals. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 15 – Bivariate associations between normative variables and traditional gambling outcomes

	Traditional gambling					
	Any form (lifetime)	**Any form at least monthly (last 12 mths)**	**Number of forms (last 12 mths)**	**Gambling problems score (last 12 mths)**	**Gambling harm score (last 12 mths)**	**Gambling problems (lifetime)**
Regression type	Logistic	Logistic	Linear	Linear	Linear	Logistic
N	1026	1026	484	402	402	883
Amount of friends who engage in simulated gambling	2.397*** (1.758; 3.268)	2.483*** (2.026; 3.044)	0.256*** (0.172; 0.340)	0.379*** (0.290; 0.468)	0.339*** (0.248; 0.430)	2.276*** (1.831; 2.827)
Friends - injunctive norms, simulated gambling	1.050*** (1.027; 1.074)	1.056*** (1.043; 1.070)	0.316*** (0.239; 0.392)	0.388*** (0.308; 0.469)	0.317*** (0.234; 0.401)	1.058*** (1.043; 1.073)
Parents - injunctive norms, simulated gambling	1.067*** (1.038; 1.096)	1.066*** (1.050; 1.082)	0.319*** (0.246; 0.391)	0.417*** (0.339; 0.495)	0.306*** (0.223; 0.389)	1.051*** (1.035; 1.066)
Family - injunctive norms, simulated gambling	1.079*** (1.047; 1.112)	1.086*** (1.068; 1.104)	0.306*** (0.236; 0.377)	0.437*** (0.362; 0.511)	0.343*** (0.264; 0.422)	1.057*** (1.041; 1.074)
Friends - descriptive norms, simulated gambling	1.070*** (1.043; 1.097)	1.061*** (1.047; 1.075)	0.355*** (0.278; 0.431)	0.450*** (0.373; 0.527)	0.374*** (0.293; 0.455)	1.068*** (1.053; 1.084)
Parents - descriptive norms, simulated gambling	1.061*** (1.032; 1.091)	1.081*** (1.063; 1.099)	0.337*** (0.266; 0.407)	0.433*** (0.362; 0.504)	0.346*** (0.270; 0.422)	1.070*** (1.052; 1.088)
Family - descriptive norms, simulated gambling	1.074*** (1.043; 1.106)	1.088*** (1.070; 1.107)	0.351*** (0.280; 0.421)	0.467*** (0.395; 0.538)	0.364*** (0.287; 0.441)	1.068*** (1.051; 1.085)
Gaming motivations - enhancement	0.981 (0.919; 1.048)	1.080*** (1.032; 1.131)	0.152** (0.053; 0.252)	0.329*** (0.224; 0.433)	0.333*** (0.229; 0.438)	1.222*** (1.158; 1.290)
Gaming motivations - social	1.110** (1.037; 1.188)	1.215*** (1.158; 1.274)	0.285*** (0.195; 0.375)	0.483*** (0.393; 0.572)	0.421*** (0.328; 0.513)	1.307*** (1.237; 1.380)
Gaming motivations - coping	1.015 (0.967; 1.066)	1.089*** (1.052; 1.127)	0.230*** (0.135; 0.326)	0.406*** (0.312; 0.499)	0.407*** (0.314; 0.501)	1.175*** (1.128; 1.223)
Gaming motivations - self-gratification	1.124*** (1.060; 1.192)	1.230*** (1.181; 1.281)	0.340*** (0.255; 0.425)	0.594*** (0.517; 0.671)	0.503*** (0.420; 0.586)	1.287*** (1.229; 1.347)

Note: Coefficients for logistic regressions are odds ratios (null value = 1), and for linear regressions are standardised coefficients (null value = 0). Values in brackets are 95% confidence intervals. PGSI was log-transformed. * $p < .05$, ** $p < .01$, *** $p < .001$

Multivariate analyses

Approach

The analyses above show *bivariate* associations for parental factors as well as gaming norms and motivations with traditional gambling behaviour, problems and harm. However, these analyses do not take into account other factors that are associated with traditional gambling behaviour, problems or harm, such as distal factors (e.g., demographics, psychological variables, comorbidities), and proximal factors (e.g., gambling motivations, urges and erroneous cognitions). While the bivariate associations above show associations between simulated and traditional gambling, these multivariate analyses attempt to control for alternate possible explanations by controlling for these other variables. These analyses only explore simulated gambling forms and not the exposure forms.

The dependent variables were traditional gambling engagement, gambling problems and gambling harm. More specifically, traditional gambling was considered in three ways: whether they had taken part in any form ever in the lifetime (no/yes), any form ever in the last 12 months (no/yes) and the number of forms they had taken part in during the last 12 months, which was only considered amongst those who reported taking part in the last 12 months. Gambling problems were assessed during the lifetime (no/yes) and the last 12 months (score on the PGSI), and gambling harm was also assessed during the last 12 months (score on the SGHS). PGSI and SGHS scores were only considered amongst those who gambled in the last 12 months. Traditional gambling engagement also served as a proximal factor for the analyses where the outcome related to gambling problems.

The independent variables were split into two components; distal and proximal. Biopsychosocial models (Williams et al., 2012), and recent studies (Browne, Hing, et al., 2019; Hing & Russell, 2019; Russell, Hing, & Browne, 2019), recognise that proximal risk factors (e.g., gambling behaviour) are likely mediators of distal risk factors (e.g., demographics). Models that include both proximal and distal risk factors together often result in the distal risk factors being fully mediated, i.e., becoming non-significant predictors of the final outcome. This is not necessarily a reflection that they do not predict e.g., problems or harm, but instead that distal factors may predict proximal factors, which may in turn predict outcomes. This is taken into account in the present analyses, by modelling distal and proximal risk factors separately.

Importantly, most risk factors (e.g., demographics, psychological variables, gambling motivations, etc) are known predictors of traditional gambling engagement and gambling problems/harm, and were not explicitly of interest in the research questions. Instead, they serve as control variables, to determine whether engagement in simulated gambling, or parental factors, were associated with traditional gambling engagement and problems/harms *over and above* these known predictors.

Adolescent simulated gaming behaviour on selected forms was included as a distal risk factor, to address research question 1. Parenting variables (involvement, connectedness and hostility, as well as supervision of gaming while growing up) were also included as distal risk factors, to address research question 2. Use of selected simulated gambling forms in the last 12 months, gaming motivations, and number of friends who engage in simulated gambling, were included as proximal risk factors, to address research question 3. Other control variables are listed in the tables below.

A further important consideration was correlation between potential predictors, including control variables. The test of a predictor within a multivariate model is whether it explains something

unique in the dependent variable. If two (or more) independent variables are highly correlated, they can cancel each other out and regression coefficients can become unstable; an issue known as multicollinearity. This is often the case in gambling research, where potentially important predictors such as gambling motivations, gambling urges and erroneous cognitions tend to be highly correlated. We first examined tolerance statistics, which measure potential issues with multicollinearity, and removed variables that were too highly correlated, particularly if they were theoretically related to each other. There were 12 variables measuring norms, based on traditional and simulated gambling, from friends, parents or other family, and both injunctive and descriptive norms. Observation of bivariate effects (above) found that the associations between these variables and other outcomes were similar (highly overlapping confidence intervals). The choice of norm variables to use in the multivariate analyses was therefore fairly arbitrary, but because parents are a major focus of this study, and because there were two variables capturing influence from friends (amount of friends who engage in simulated and traditional gambling forms), we opted to use parental norms for both traditional and simulated gambling. Further, we opted for injunctive norms (based on the perceptions of their parental approval of these behaviours), rather than descriptive norms (which are more related to observations of their parents' overt behaviour). The parental injunctive norms for traditional and simulated gambling were still correlated (r~.5), but we included both. Similarly, parental connectedness was highly correlated with involvement (r~.8), but neither were associated with hostility. We therefore removed connectedness. Similarly, for proximal factors, the gambling motivation subscales were highly correlated with each other, and also with gambling urges. We therefore opted to remove the gambling motivations from consideration. Like the gambling motivations, the gaming motivations were also highly correlated with each other, and here we opted to retain one subscale, since there were no alternate scales. Based on earlier results, we opted to retain self-gratification, as it had the strongest relationship with most of the outcome variables, although we note that again, the confidence intervals for the gaming motivations overlap. Based on these exclusions, there were no issues with multicollinearity for either the distal or proximal models (all tolerance > .4).

Some of the control variables, such as marital status and living arrangement, were split into binary variables based on the largest category, to reduce unnecessary model complexity. These groups are indicated in the tables below.

There were no missing data for any of the variables apart from some dependent variables. For example, when considering gambling engagement, whether or not someone took part in traditional gambling potentially included all respondents. However, when considering the number of forms they were engaged in, the analysis was only conducted for those who took part in one or more forms. However, one consideration was required for the gender variable. Eight respondents indicated a gender other than male or female, and small groups cause problems in regression models. Due to this statistical consideration, these eight respondents could not be included in these analyses[4].

The analyses below also include bivariate associations for all variables, some of which are reported above. The present bivariate results may be slightly different to those above due to the exclusion of some respondents, based on gender.

[4] We understand that this may seem to be an insensitive decision, and is only made on the basis of statistical analysis considerations. The only other solution would be to include the eight respondents in one of the other gender categories.

Three tables are presented: distal factors predicting traditional gambling outcomes (Table 16), proximal risk factors predicting traditional gambling outcomes (Table 17), and distal risk factors predicting proximal risk factors (Table 18). The main variables of interest are presented in black text. The other variables (demographics, for example) are important in the analysis, because they represent known predictors of traditional gambling outcomes, but interpreting them does not assist with the research questions. They are therefore greyed out in the tables and are not interpreted below. Statistically significant results for the variables of interest are coloured red, and bivariate and multivariate results are both presented in the same tables.

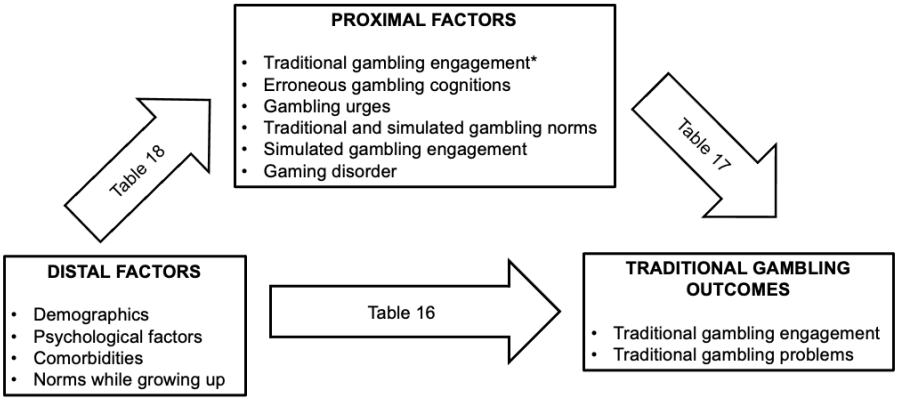

Figure 3 - Diagram explaining the multivariate models

Results

Table 16 shows which distal risk factors predict traditional gambling outcomes. The main distal risk factors considered were parental injunctive norms in relation to simulated gambling, parental rule setting in relation to gaming, and parent-adolescent relationship style, considering involvement and hostility. As seen in Table 16, simulated gambling parental norms were associated with all traditional gambling outcomes: engagement and problems. When controlling for all other factors in the model, parental simulated gambling norms still predicted four of the five traditional gambling outcomes, but not lifetime engagement in traditional gambling. Parental rule setting in relation to gaming, and parental-adolescent involvement, were not significant in the multivariate models. Hostility was not significant in most multivariate models, except for predicting level of engagement in traditional gambling (i.e., how many forms the respondent engaged in over the last 12 months). In summary, parental norms predict all outcomes apart from lifetime engagement in traditional forms, and hostility only predicts level of engagement in traditional gambling in the last 12 months, when taking into account all other distal risk factors.

Table 17 shows which proximal risk factors predict traditional gambling outcomes. The key predictors were at-least monthly engagement in simulated gambling in the last 12 months, the amount of friends involved in simulated gambling (norms), gaming for self-gratification, and whether or not the respondent is classified as experiencing gaming disorder. At-least monthly simulated gambling was associated with all traditional gambling outcomes: engagement and problems. Amount of friends engaged in simulated gambling did not significantly predict any of the traditional gambling outcomes. Gaming for self-gratification was associated with traditional

gambling problems, either in the lifetime or the last 12 months. Experiencing gaming disorder was also associated with traditional gambling problems, but only in the lifetime, not in the last 12 months. Gaming for self-gratification and gaming disorder were not associated with traditional gambling engagement.

Table 18 shows a different part of the model: which distal factors predict which proximal factors, when controlling for other known distal factors. This table helps to show potential pathways from distal factors to traditional gambling outcomes, via proximal risk factors. For example, simulated gambling norms are associated with at-least monthly simulated gambling in the last 12 months (Table 18), and at-least monthly simulated gambling in the last 12 months is associated with traditional gambling engagement and problems (Table 17). Parental hostility and parental norms in relation to simulated gambling were the strongest predictors of these proximal risk factors, showing their importance in models predicting traditional gambling outcomes.

Table 16 – Distal risk factors predicting traditional gambling outcomes

	TG (any form, lifetime)	TG (any form, last 12 months)	TG (number of forms, last 12 months)	TG problems (last 12 months; PGSI)	TG problems (lifetime, NODS-CLiP)	TG (any form, lifetime)	TG (any form, last 12 months)	TG (number of forms, last 12 months)	TG problems (last 12 months; PGSI)	TG problems (lifetime, NODS-CLiP)
	Bivariate					Multivariate				
SG - norms (parents, injunctive)	0.649***	0.646***	0.404***	0.465***	0.569***	0.061	0.306**	0.191***	0.275***	0.356***
SG - parental rule setting	0.129	0.036	0.073*	0.046	0.101			0.024		
Parents - involvement	0.026	0.041	0.032	-0.048	-0.038					
Parents - hostility	0.135	0.278***	0.194***	0.287***	0.320***		0.119	0.059*	0.070	0.115
Age	0.398***	0.174**	0.122***	0.125*	0.042	0.156	-0.016	0.026	0.010	
Gender (ref = female)	-0.012	0.701***	0.316***	0.411***	0.642***		0.712***	0.220***	0.273***	0.640***
Single (ref = no)	-0.985***	-0.461***	-0.292***	-0.195	-0.279*	-0.238	-0.016	-0.052		0.104
Education	0.245**	0.09	0.097**	0.138**	0.068	-0.034		0.010	0.072	
Working (ref = no)	1.202***	0.880***	0.367***	0.344**	0.499***	0.840***	0.671***	0.173**	0.156	0.416*
Born overseas (ref = no)	-0.446*	-0.436**	-0.14	-0.175	0.174	-0.177	-0.332			
ATSI status (ref = no)	2.457*	0.852**	0.667***	0.767***	0.865***	2.131*	0.625*	0.415***	0.551***	0.643*
Live with parents (ref = no)	-1.111***	-0.663***	-0.365***	-0.469***	-0.687***	-0.606*	-0.367*	-0.115	-0.217*	-0.521***
Income - personal	0.601***	0.446***	0.221***	0.211***	0.226***	0.127	0.136	0.051	-0.001	-0.016
Wellbeing	0.057	0.041	0.064*	-0.011	-0.022			0.044		
Impulsivity	0.307***	0.243***	0.177***	0.318***	0.333***	0.202	0.042	0.079**	0.179***	0.131
Perceived social support	-0.022	-0.059	-0.009	-0.07	-0.062					
Psychological distress (ref = no)	0.015	0.542***	0.340***	0.696***	0.761***		0.330*	0.101	0.305**	0.514**
Alcohol use	0.786***	0.554***	0.306***	0.278***	0.419***	0.512***	0.300***	0.128***	0.045	0.184*
TG - first engaged while underage			0.026	-0.027	0.356*			-0.018		0.401*
TG - norms (parents, injunctive)	1.113***	0.591***	0.367***	0.347***	0.389***	0.974***	0.330***	0.159***	0.046	0.084
Constant						2.360***	-0.719***	-0.178*)	-0.310**	-0.963***
Observations	1018					1018	1018	1018	401	1018
Log Likelihood						-325.59	-592.328	-1270.09	-470.631	-613.669

Akaike Inf. Crit.						677.179	1214.657	2576.18	969.263	1255.338

Note: All continuous variables scaled prior to analysis. The null value for all coefficients is 0. * $p < .05$, ** $p < .01$, *** $p < .001$. Note, coefficients only reported here in the interests of space. Confidence intervals are reported in the appendix. SG = simulated gambling, TG = traditional gambling, ATSI = Aboriginal or Torres Strait Islander.

Table 17 – Proximal predictors of traditional gambling outcomes

Predictors	TG (any form, lifetime)	TG (any form, last 12 months)	TG (number of forms, last 12 months)	TG problems (last 12 months; PGSI)	TG problems (lifetime, NODS-CLiP)	TG (any form, lifetime)	TG (any form, last 12 months)	TG (number of forms, last 12 months)	TG problems (last 12 months; PGSI)	TG problems (lifetime, NODS-CLiP)
	Bivariate					Multivariate				
SG - at least monthly in the last 12 months	1.380***	1.902***	0.968***	1.030***	1.653***	0.540*	1.209***	0.331***	0.251***	0.701***
SG - amount of friends involved	0.603***	0.620***	0.329***	0.387***	0.614***	-0.032	-0.078	0.004	0.015	0.064
Gaming motivation - self gratification	0.386***	0.701***	0.389***	0.602***	0.832***	-0.213	0.007	-0.009	0.142***	0.236*
Gaming disorder (ref = no)	0.961*	1.067***	0.929***	1.181***	1.826***	-0.119	-0.369	0.106	0.130	0.733*
TG - number of forms, last 12 months				0.582***	0.965***				0.032	0.118
TG - expenditure last 12 months (log)			0.606***	0.482***	0.623***			0.359***	0.110**	0.11
TG - amount of friends involved	1.052***	0.870***	0.367***	0.202***	0.600***	0.890***	0.701***	0.076**	-0.035	0.298**
Erroneous gambling cognitions	0.663***	0.598***	0.386***	0.598***	0.806***	0.404**	0.140	0.056*	0.219***	0.409***
Gambling urges	1.881***	1.339***	0.627***	0.762***	1.099***	1.248***	0.950***	0.330***	0.427***	0.411***
Constant						2.548***	-0.481***	-0.151***	-0.162**	-0.581***
Observations	1018	1018	1018	401	1018	1018	1018	1018	401	1,018
Log Likelihood						-322.182	-501.404	-1028.863	-332.053	-529.912
Akaike Inf. Crit.						660.365	1018.808	2075.726	684.106	1,079.82

Note: All continuous variables scaled prior to analysis. The null value for all coefficients is 0. * $p < .05$, ** $p < .01$, *** $p < .001$. Note, coefficients only reported here in the interests of space. Confidence intervals are reported in the appendix.

Table 18 – Distal risk factors as predictors of proximal risk factors

Predictors	TG - number of forms, last 12 mths	TG - expenditure last 12 mths (log)	TG - amount of friends involved	Erroneous gambling cognitions	Gambling urges	SG - at least monthly in the last 12 mths	SG - amount of friends involved	Gaming motivation - self gratification	Gaming disorder (ref = no)
	Linear	Linear	Linear	Linear	Linear	Logistic	Linear	Linear	Logistic
SG - norms (parents, injunctive)	0.404***	0.259***	0.255***	0.304***	0.571***	0.679***	0.343***	0.419***	0.606***
SG - parental rule setting	0.073*	0.079*	0.142***	0.006	0.065*	0.058	0.110***	0.087**	0.322**
Parents - involvement	0.032	0.034	0.131***	-0.062*	-0.007	-0.099	0.069*	0.056	-0.001
Parents - hostility	0.194***	0.151***	0.215***	0.148***	0.261***	0.330***	0.230***	0.250***	0.677***
Age	0.122***	0.116***	0.118***	0.055	0.078*	0.093	0.012	0.037	0.064
Gender (ref = female)	0.316***	0.153*	0.221***	0.058	0.350***	1.190***	0.234***	0.569***	0.610**
Single (ref = no)	-0.292***	-0.156*	-0.387***	-0.081	-0.272***	-0.380**	-0.377***	-0.124	-0.262
Education	0.097**	0.045	0.068*	0.061	0.098**	0.076	0.038	0.080*	-0.099
Working (ref = no)	0.367***	0.294***	0.377***	0.158*	0.285***	0.504***	0.217***	0.180**	0.511*
Born overseas (ref = no)	-0.140	-0.134	-0.073	0.189*	-0.069	-0.157	-0.002	0.222**	0.164
ATSI status (ref = no)	0.667***	0.462***	0.274*	0.634***	0.791***	0.934***	0.338**	0.302*	1.064***
Live with parents (ref = no)	-0.365***	-0.284***	-0.306***	-0.350***	-0.414***	-0.549***	-0.295***	-0.305***	-0.825**
Income - personal	0.221***	0.219***	0.209***	0.051	0.183***	0.269***	0.157***	0.082**	0.272*
Wellbeing	0.064*	0.011	0.088**	-0.020	0.008	-0.006	0.031	0.026	-0.085
Impulsivity	0.177***	0.118***	0.107***	0.187***	0.286***	0.471***	0.182***	0.173***	0.686***
Perceived social support	-0.009	-0.008	0.093**	-0.136***	-0.060	-0.205**	0.022	0.029	-0.014
Psychological distress (ref = no)	0.340***	0.201**	0.310***	0.369***	0.497***	0.919***	0.490***	0.449***	1.271***
Alcohol use	0.306***	0.223***	0.342***	0.139***	0.329***	0.490***	0.302***	0.176***	0.629***
TG - first engaged while underage	0.026	-0.111	0.135	0.003	0.018	0.110	0.176*	-0.002	0.109
TG - norms (parents, injunctive)	0.367***	0.246***	0.293***	0.257***	0.505***	0.453***	0.247***	0.280***	0.557***
Observations	1018	1018	1018	1018	1018	1018	1018	1018	1018

Note: All continuous variables scaled prior to analysis. The null value for all coefficients is 0. * $p < .05$, ** $p < .01$, *** $p < .001$. Note, coefficients only reported here in the interests of space. Confidence intervals are reported in the appendix. SG = simulated gambling, TG = traditional gambling, ATSI = Aboriginal or Torres Strait Islander.

Discussion

This chapter summarises the key results for each of the three research questions. It then discusses the implications of the findings and outlines the study's limitations.

Research questions

Summary of results for Research question 1

RQ 1 was: Is playing games with gambling-related content associated with subsequent gambling behaviour and gambling-related harm, including at any point during adolescence and young adulthood? This study conceptualised games with gambling-related content as comprising two categories of activities. The first, 'exposure forms', consisted of playing esports video games, watching esports, opening free loot boxes and engaging in free fantasy sports. The second, 'simulated gambling', comprised playing video games with gambling content, purchasing loot boxes, playing free and paid social casino games and playing demo games.

Age of participating in exposure, simulated gambling and traditional gambling forms

The age of first participating in exposure, simulated gambling and traditional gambling forms varied. Respondents were more likely to engage in the exposure forms of playing esports video games and opening free loot boxes, and the simulated form of playing video games with gambling components before age 18. Most respondents who engaged in traditional forms of gambling appeared to wait until they were 18 to do so, but many respondents first engaged in these traditional gambling forms soon after. Age of first engagement in simulated gambling was spread across the age ranges captured in the survey. First engagement in some simulated forms, such as paid social casino games, demo games, and paid loot boxes, was most likely to occur from age of 22. In Australia, the exposure forms and simulated gambling forms are readily available to those under the age of 18. One might therefore expect that first engaging in these forms might be more likely to occur before the age of 18, whereas engagement in traditional gambling products should not occur until the age of 18, due to legal restrictions. The results largely align with these expectations.

Order of first participating in exposure, simulated gambling and traditional gambling forms

Respondents were more likely to first play esports video games, open free loot boxes, and play video games with gambling components before first engaging in most traditional gambling forms. However, respondents were more likely to first engage in some of the less harmful traditional gambling forms (lottery tickets, scratch cards, bingo) before first engaging in some of the exposure and simulated forms, especially free and paid social casino games and demo/practice games on gambling websites. Respondents were also more likely to first purchase loot boxes, watch esports, and enter free fantasy sports competitions before first engaging with some of the more harmful traditional gambling forms, including wagering forms (sports, race, esports and novelty betting) and casino games.

Migration to gambling and gambling problems?

Several researchers have raised concerns that simulated gambling is a 'gateway' to gambling and gambling problems (Kim et al., 2017; King & Delfabbro, 2020; Rockloff et al., 2021). This migration question is an important one. The life course analysis in this study showed that the relationship

depended strongly on the simulated and traditional forms involved. The results above indicate that uptake of at least some exposure and simulated forms is more likely to occur before uptake of some forms of traditional gambling. While this does not demonstrate migration, a causal pathway is still possible. However, the analyses of age of first onset, as well as age of most frequent participation, suggest that some simulated gambling forms that very closely emulate real gambling games, especially social casino games and demo games, may *follow* engagement in traditional gambling forms. It may be that respondents first gain an interest in real monetary gambling, and then engage in these simulated gambling activities as they offer a free or lower cost alternative.

Engagement in all exposure and simulated gambling forms was associated with traditional gambling engagement, problems and harm. Further, when considering simulated gambling engagement as a whole, rather than examining individual forms, associations were still observed with traditional gambling engagement and problems, even when controlling for other known predictors of these outcomes. While we cannot determine if engagement with simulated forms *causes* traditional gambling harm from this study, it is clear that engagement with simulated gambling explains unique variance in traditional gambling engagement and harm.

An alternative hypothesis

As noted above, migration from exposure and simulated gambling forms to traditional gambling engagement and gambling problems cannot be inferred from the results. An alternative hypothesis is that exposure and simulated gambling forms appeal to the same kinds of people who engage in traditional gambling activities, as well as those that experience gambling problems. The risk factor analysis found that engaging in simulated gambling was associated with traditional gambling engagement, as well as gambling problems. These associations remained significant even when controlling for known predictors of traditional gambling engagement and problem gambling. This indicates that people who engage in simulated gambling are more likely to engage in traditional gambling and experience gambling problems, even when controlling for demographics, psychological variables, and a range of other variables. At the very least, this suggests that people who engage in simulated gambling are also more likely to engage in traditional gambling and experience gambling problems, compared to people who do not engage in simulated gambling.

Summary of results for Research question 2

RQ 2 was: Is the quality of the parent-adolescent relationship (e.g., hostile, connected), or other parental factors (e.g., supervision, norms) related to adolescent use of games with gambling-like content, and associated with greater (or lower) risk of subsequent gambling engagement and gambling-related harm?

Parent-adolescent relationship

Three dimensions of the parent-adolescent relationship were considered in this study, based on the Parent-Adolescent Relationship Scale (Burke et al., 2021), a new scale that measures connectedness, involvement and hostility. Hostility was the most ‘informative’ dimension, and refers to negativity, criticism and conflict in the parent-adolescent relationship. Greater hostility in an adolescent’s relationship with their parent was associated with engagement in simulated and traditional gambling, as well as problem gambling and problematic gaming. However, in the multivariate analysis, when controlling for other known predictors, hostility was no longer a statistically significant predictor of most traditional gambling outcomes, apart from level of traditional gambling engagement (measured by the number of forms respondents engaged in during the last 12 months). Hostility may not have remained significant when controlling for other

variables because it was statistically associated with psychological distress and parental injunctive norms about simulated gambling, both of which remained significant in the models. Thus, the non-significance of hostility in the multivariate models was more of a function of other related variables, rather than lack of importance of the hostility variable. Gambling often provides an escape from stressful situations (Buchanan et al., 2020), and a hostile parent-child relationship is likely to be stressful for the adolescent. Gambling may therefore provide an escape from that situation, and subsequently lead to gambling problems. It is important not to dismiss the importance of this variable simply because it was not significant in the multivariate models. Instead, further research could clarify its potential role in gambling and gaming problems. However, it is also important to note these results do not show causality, and other explanations are possible. For example, an adolescent who gambles, when their parents disapprove of them gambling, may lead to some hostility in the relationship between the adolescent and their parents or guardians.

In contrast, neither parental involvement or parental connectedness were associated with simulated or traditional gambling outcomes, problem gambling or problematic gaming, either as risk or protective factors. This was true for both the bivariate relationships as well as the multivariate analyses.

Parental supervision/restriction of certain video games

Parental restriction of gaming when growing up was associated with gaming problems, although the causal direction is unclear. It is plausible that parents may restrict access to games when gaming is becoming problematic for their child. The alternative pathway is possible but less likely, that parental restriction of games leads to gaming problems. The direction of this relationship requires further study.

Parental norms

We considered four types of parental norms. Two related to simulated gambling: perceived approval of taking part in simulated gambling (parental injunctive norms) and perceived parental gaming behaviour (descriptive norms). We also considered injunctive and descriptive norms in relation to traditional gambling behaviour. All were considered in the bivariate analysis, but were strongly correlated, so only one (injunctive norms related to simulating gambling) could be included in the multivariate analyses. In the bivariate analyses, all parental norms were associated with simulated gambling and traditional gambling outcomes: that is, higher perceived approval and higher parental engagement in both simulated and traditional gambling were associated with the respondents' simulated and traditional gambling, problem gambling and problematic gaming. The one exception was perceived parental approval of traditional gambling not being associated with engagement with any form of simulated gambling in the lifetime. As seen in recent studies (Hing et al., 2021), the role of parents in normalising simulated and traditional gambling amongst youth is an important one, and the present results indicate that implicit approval of these forms is associated with gambling and gaming problems later in life.

Summary of results for Research question 3

RQ 3 was: What roles do gaming motivations and competing social influences (from peers and parents), play on engagement with games with gambling-like features during adolescence and subsequent gambling behaviour and gambling-related harm?

Gaming motivations

We explored four gaming motivations: enhancement, social, coping and self-gratification. All were associated with higher levels of simulated gambling behaviour, and a higher risk of gaming problems. All were also associated with engagement with traditional gambling in the last 12 months, as well as higher risks problem gambling (either lifetime or the last 12 months). In addition, gaming for social reasons or for self-gratification was associated with lifetime traditional gambling involvement. However, all motivation subscales were strongly correlated with each other (r~.5 to .8), meaning that it is difficult to apply different meanings to the different motivations. What can be drawn from the results is that people who are more strongly motivated for any of these reasons are more likely to be more engaged in either (or both) simulated and traditional gambling, and experience gambling and gaming problems. However, examination of the confidence intervals in the bivariate associations with simulated and traditional gambling outcomes showed that playing games for self-gratification were often the strongest, indicating that this may be an important motivation to study further.

Competing social influences from parents and friends

We expected to find potentially competing norms from parents and from friends, in that friends might be more approving or involved in gaming than parents. While this might be the case for some individuals, this was not the case when examining results across the whole sample. Injunctive norms for simulated gambling for parents was very strongly correlated with the equivalent norms for friends (r~.84), meaning that people who thought that their friends would approve of playing simulated gambling were also generally likely to think that their parents would also approve. Thus, at a whole sample level, we have no evidence of competing social influences. Further, respondents whose parents were more likely to approve, or whose parents were perceived to take part, were also more likely to have more friends who took part in both simulated and traditional gambling. This aligns with recent results about social influences from family and friends in that, often, these influences come from both family and friends, rather than one or the other (Russell, Langham, & Hing, 2018). Importantly, those who experience more social influence, either through norms from parents or family, or through the number of friends who take part in simulated or traditional gambling, were more likely to take part in both simulated and traditional gambling, and experience gambling and gaming problems.

Implications

Migration from simulated gambling to traditional (monetary) gambling

A few longitudinal studies have examined migration from simulated gambling to monetary gambling (Dussault et al., 2017; Hayer et al., 2018). Amongst 1,220 adolescents who had never participated in monetary gambling, 28.8% reported having gambled 12 months later (Dussault et al., 2017). However, simulated gambling at baseline predicted later uptake of monetary gambling only in relation to poker. Amongst 1,178 school students (Hayer et al., 2018), 11.9% of those who had never gambled reported gambling one year later, and this migration was associated with simulated gambling on social networks. While these studies are informative, additional research is needed to ascertain whether simulated gambling provides a gateway to gambling. Because a prospective longitudinal study was beyond the resources available for the current study, it used a retrospective life course approach to examine this issue amongst emerging adults.

Our analyses also differed from previous longitudinal analyses by considering exposure forms as well as simulated gambling. This added important nuance, because games on social network sites

might be paid or free-to-play social casino games, and loot boxes can be acquired for free or be purchased, for example. Our examination of these distinctions has provided new and more detailed information in relation to potential migration patterns. Specifically, we found that playing esports video games, watching esports, obtaining free loot boxes and playing video games with gambling content were more likely to precede most traditional gambling forms. However, first uptake of other simulated forms, especially free or paid social casino games, and demo games, was significantly more likely to occur *after* people first engaged in certain traditional forms. Some of these traditional forms were relatively innocuous, such as buying lottery tickets or scratch cards, or playing bingo. However, engagement in social casino games and demo games was also more likely to occur after some of the more harmful forms, especially pokies/EGMs, sports betting, paid social casino games, race betting and casino games.

Examining these more detailed patterns is, to our knowledge, novel in the literature and provides new information to inform the migration hypothesis. It is important to note that these findings may be distinctive to Australia, given its relatively long history of legalised gambling, cultural acceptance of gambling, and widespread availability of pokies in most pubs and clubs around the country (except in Western Australia). Young people may therefore engage in traditional gambling forms at a younger age than in countries with less access to legalised gambling. However, the results do highlight that some activities (e.g., playing esports video games, watching esports, free and paid loot boxes, and playing video games with gambling content) are more popular amongst younger people, especially while under the age of 18. Because they are not restricted, young people have ready access to these forms, and it is perhaps unsurprising that their uptake occurs before traditional gambling forms, which are age restricted.

The bivariate and multivariate results showed that engagement in simulated gambling predicted engagement in traditional gambling, as well as gambling problems. However, these results should not be taken as support of the migration hypothesis, as they are based on cross-sectional results and do not take the temporal sequence of these activities into account. Nonetheless, these results are consistent with other studies that have found that young people who gamble and have gambling problems have higher participation in simulated gambling (Hing et al., 2021; King & Delfabbro, 2016; King et al., 2014). However, no longitudinal research has investigated a directional relationship between participation in simulated gambling during adolescence and subsequent gambling and problem gambling in adulthood.

Rather than finding consistent evidence of migration from simulated gambling to traditional gambling, our interpretation of our results is that simulated gambling forms appeal to the same kinds of people who engage in traditional gambling forms. This is consistent with previous cross-sectional studies indicating that simulated gambling is more prevalent amongst young people who gamble (Baggio et al., 2016; Hing et al., 2021; King et al., 2014; Wardle, 2019). Migration is certainly possible, and we do not discount that migration does occur for some people. However, at the sample level, these results do not indicate migration for all forms of simulated gambling. In fact, social casino games and demo games were more likely to follow engagement in traditional gambling forms, including some wagering activities and pokies.

It is important to note that some exposure and simulated gambling forms, particularly loot boxes, and to a less extent social casino games, are relatively new phenomena. Therefore, some of our results may reflect that these forms were not necessarily available through the entire adolescence of some respondents.

In summary, our results raise questions about the migration hypothesis from simulated gambling to traditional gambling. Consistent results for this migration effect were not found when the age of uptake of individual exposure, simulated and traditional forms were examined.

Role of parents

The findings indicate that parents play a crucial role in the uptake of exposure forms, simulated gambling and traditional gambling. Both perceived parental approval and perceived parental engagement with simulated and traditional gambling forms were predictors of respondents' engagement in both simulated and traditional gambling. Further, perceived parental approval of traditional gambling was a unique risk factor for traditional gambling engagement and problems, even when controlling for other known predictors of these outcomes. These results are similar to those found in the NSW Youth Gambling Study 2020 (Hing et al., 2021) where adolescents were less likely to gamble, intend to gamble or have a gambling problem if their parents disapproved of their gambling. Respondents were more likely to be a problem/at-risk gambler if adults in the household gambled with them, did not set limits on their online use, or had gambling problems themselves. Consistent with the literature (Dowling et al., 2010, 2016), a problem gambling adult in the household when growing up uniquely predicted problem/at-risk gambling amongst adolescent survey respondents. Respondents were also more likely to engage in simulated gambling and meet criteria for problematic gaming if their parents did not set rules about online use. Overall, these findings indicate that parental attitudes and behaviours related to gambling may be important contributors to adolescent gambling participation. It highlights social learning influences as being important to the transmission of gambling behaviour across generations.

A second important parental variable was the nature of the relationship between the young person and their parent when they were growing up. Respondents who perceived their relationship with their parents to be characterised by hostility, rejection and criticism were more likely to engage in both simulated and traditional gambling, and to experience gaming and gambling problems. Parental hostility has a range of negative implications for young people, including increasing the risk of depression, antisocial behaviour and aggression, and other potentially addictive behaviours, like alcohol and substance use (Diggs et al., 2017; Fotti et al., 2006; Putnick et al., 2015). These findings add to this large body of research and show that the broader relationship context, and particularly parental hostility, may be important in understanding the development of gambling problems in youth.

Gambling is often used as an escape from stressful circumstances (Buchanan et al., 2020), which may include a hostile relationship with one's parent(s). Repetitive forms of gambling, particularly pokies, offer a means of escape and avoidant-based coping because they allow the player to zone out, or dissociate from stress, worries and life problems (Livingstone, 2005; Schüll, 2012). The same may be the case for some simulated forms of gambling that require little thought and repetitive actions, such as most social casino games. In contrast, forms such as video games or loot boxes may offer a distraction and escape not through repetitive gameplay, but instead through immersion, thrill and excitement (Rockloff, Russell, Greer, et al., 2020; Zendle et al., 2019).

The findings indicated that both gambling-specific (i.e., parental approval, parental restrictions on online activity) and more general family relationship factors (i.e., hostility in the parent-adolescent relationship) play a role in gambling among young people. In comparison to distal socioeconomic risk factors, parenting is modifiable and therefore can be targeted in programs to prevent or reduce harms associated with youth gambling. Parenting programs that focus on targeting modifiable parenting factors, namely parenting practices and parent-child relationship behaviours, have been

shown in controlled trials to reduce problematic and disruptive adolescent behaviour (Sanders et al., 2014) and improve adolescent mental health (Yap et al., 2017).

It can be difficult for parents to have full awareness of all games that their children play, especially when their children are out of the house, such as when they are at school. Further, many of these simulated gambling activities, as well as some of the newer traditional forms, are relatively new. Parents may know little about esports betting, skin gambling or loot boxes because they did not exist when the parents were younger. Further research is needed with parents themselves to assess their knowledge and awareness of new forms of gambling and simulated gambling and their understanding of gambling exposure and harm. Such research could then inform parent education programs designed to help parents protect their children from the risks associated with these activities.

Social influences

While parental norms appear to be a crucial influence on a young person's gambling and simulated gambling, so are norms from friends. Many simulated gambling activities reward players for engaging their friends, often through in-game rewards. For example, if a person invites a friend to take part in a social casino game, and the friend does so, that person may receive a reward in the form of an unlockable in-game item or in-game currency. This means that many of these simulated gambling forms are likely to spread through social connections. This has implications for the development of problems, as well as the ability to resolve problems. This study found that the amount of friends who take part in both simulated gambling and traditional gambling predicted more engagement in these forms, as well as gambling and gaming problems. This is in line with previous research (Russell, Langham, & Hing, 2018; Russell, Langham, Hing, et al., 2018), where people in higher gambling risk groups had more gamblers in their social networks, including amongst family, friends and work colleagues. Further, the social networks of those in higher risk groups were more heavily intertwined, meaning that it can become hard to remove oneself from these social influences on gambling. This is important, because many of these exposure and simulated forms offer a means to socialise with others, as well as to gain social status if one succeeds, especially in the activities related to video games (Rockloff, Russell, Greer, et al., 2020; Zendle et al., 2019). People who form or maintain connections with people based on gambling, and avoid socialising with people who do not, may find that reducing engagement later on is difficult (Russell, Langham, & Hing, 2018). It is reasonable to suspect that this is the case with games, but to our knowledge, this has not been tested and is an avenue for further research. Stronger connection to an online community has been associated with participation in simulated gambling and problematic gaming in young people (Hing et al., 2021). Further, online communities can be attractive to people who are dissatisfied with their offline social networks, and who are interested in gambling or have gambling problems (Sirola et al., 2018, 2019). It is important to educate people about the influence of social norms on both simulated gambling and traditional gambling.

Implications for game developers and publishers

The nature of video and digital games is changing rapidly, especially the way that games are monetised as the game progresses, such as purchasing more in-game currency in social casino games, or buying loot boxes. Until recently, a player would buy a game outright before playing. With the advent of app stores, games could be bought for smaller upfront amounts, or even for free, with payment sometimes required later to unlock more features or levels, but costs were usually capped. The most recent development is that of microtransactions, where players pay relatively small amounts to buy currency or other items to use in the game, or to purchase entries into other in-game reward mechanisms, such as loot boxes (King, 2018). Importantly, these

microtransactions are not capped, and players can continue to pay many times over. Further, purchased loot boxes often include items that are not available in loot boxes that are earned through gameplay. Given that most developers have moved to this model, it appears to be a highly lucrative tactic. For example, between one-sixth and one-third of young people report purchasing loot boxes in the previous 12 months (DeCamp, 2021; eSafety Commissioner, 2018; Ipsos MORI, 2019), with about one-third spending money on other types of microtransactions in video games (Hing et al., 2021). However, these games appear to rely on a relatively small number of people who pay large amounts to play. For example, survey data from 7,767 loot box purchasers showed that the top 5% of spenders generated half of the loot box revenue (Close et al., 2021). In this respect, there are similarities with gambling operators who typically gain a disproportionate amount of their revenue from heavily involved gamblers, especially those with gambling problems (Fiedler et al., 2019; Williams & Wood, 2007). Offering limit-setting for simulated gambling games, as required of online gambling operators as part of Australia's National Consumer Protection Framework for Online Wagering, would help to protect gamers from spending more than they can afford. Gaming operators could also ensure their marketing is responsible, does not target vulnerable individuals, and provides links to help services.

Implications for regulators

Some simulated gambling forms warrant closer attention from regulators. Loot boxes are currently not regulated as a gambling activity in Australia, but some types of loot boxes meet the criteria for a gambling product. They have similar structural characteristics to gambling because they involve risking money for a chance-based reward of uncertain value, as well as similar psychological drivers to gambling that arise from their variable ratio reinforcement schedule (Drummond & Sauer, 2018; Drummond et al., 2020; Greer et al., 2019).

Currently, major changes are underway to online gambling in Australia due to the implementation of the National Consumer Protection Framework for Online Wagering. Some of these changes could also be considered for simulated gambling, and video games in general. One example is the ability for customers to set limits. Online wagering operators in Australia must offer deposit limits, which restrict how much a person can deposit into their account within a certain time period. Currently, no such mechanisms are in place for simulated gambling activities, and players are free to keep spending. Such a limit-setting mechanism could be a useful harm-reduction measure for simulated gambling forms that involve expenditure, including loot boxes and social casino games.

Video games also feature age ratings, which help parents and players determine whether a game is age-appropriate. A 2012 study examined Australian classification practices for commercial games featuring simulated gambling (King et al., 2012). It found that all of the 100 games that were classified as suitable for commercial sale to youth in Australia in the decade prior to publication were rate as PG (parental guidance recommended, suitable for those aged 8+) or G (general audience, suitable for all ages). A higher rating should be considered for games that include gambling components, and particularly games that are solely based around simulating actual gambling practices, such as social casino games. Further, a rating of R18+ (i.e., only available to those aged 18 or older) could be considered for simulated gambling forms where one can spend money, such as paid social casino games, to bring them in to line with restrictions on traditional gambling forms.

However, these restrictions are difficult to enforce with games. Two restricted ratings exist for games: MA15+ and R18+. MA15+ are restricted to people over the age of 15 (or people under the age of 15 can gain consent from their parent or another adult exercising parental control), and R18+ games are restricted to people over the age of 18. However, age checks are usually only

performed when the game is initially purchased, and checks during digital purchases are difficult to implement. Once a game is owned, no further age checks are conducted. Incorporating gambling content into age ratings is a useful step, but only in the presence of robust age verification checks, both at the time of purchase, and ongoing checks over time to ensure the original purchaser is still the person playing, rather than an underage person.

Limitations

The study recruited respondents from paid online research panels, so the sample may not be representative of the population of 18-25 year olds in Australia. However, examining associations with gaming and gambling problems requires a reasonable number of respondents experiencing those issues in the sample, which is not attainable in a representative sample unless it very large. Using a sampling method which gained an overrepresentation of respondents experiencing gambling and gaming problems is a strength of this study rather than a limitation, particularly because studies using paid online convenience samples tend to yield similar results to those found in representative samples (Russell et al., 2021).

The study relied on self-report, with associated recall biases. This was most likely to manifest in the data about the age that respondents first, most recently, and most frequently engaged in each form. Exact data for these ages, however, was not necessarily required. Instead, results were generally based on relative ages across exposure, simulated and traditional forms. Any biases were likely to be similar across forms, so may not have unduly affected the results.

There was the possibility of social desirability bias with the age that respondents reported first engaging in each traditional gambling form, because it is illegal for respondents to take part in these activities when under the age of 18. A similar bias may have applied to simulated gambling forms, as some respondents may have thought that they were also illegal for those under the age of 18. However, as seen in previous work (Hing et al., 2021), parents, older siblings or friends, or other family members often facilitate access to these forms when underage, so respondents might not have been concerned about reporting taking part when underage. We further attempted to minimise this bias by reminding participants that the survey was anonymous when these questions were asked.

Our methodologies do not allow for us to infer causation, and temporal sequence alone is not enough to infer causation. Prospective longitudinal studies are needed to rigorously test any migration effect from exposure forms to simulated gambling to traditional gambling. We suggest that these studies need to ‘unpack’ the different types of exposure and simulated gambling forms more than previous studies have done. This is important, given that these activities vary greatly in important features, such as their monetisation and gambling-like mechanics, and because our results identified varying pathways when these different activities were examined. Qualitative research may be useful for expanding our understanding of youth gaming and gambling (Kristianse & Trabjerg, 2017).

Conclusions

The present study found that “exposure forms” (e.g., watching esports, playing esports video games) and simulated forms of gambling (e.g., playing social casino games and demo games) were associated with gambling engagement, gambling problems and gambling harm, but that most of the simulated gambling forms did not *precede* engagement in traditional gambling. While previous research has explored migration from simulated to traditional forms of gambling, these results suggest that this may not be the case, and that instead simulated forms may instead appeal to people who also engage in traditional gambling. This finding does not negate the need to monitor or regulate simulated gambling forms, since engagement with simulated gambling forms was also associated with problematic gaming.

Further, we found that parents are a key influence on young people’s engagement in both simulated gambling and traditional gambling, and with experiencing gambling and gaming problems. These influences occur through parental approval, parental behaviour, and the nature of the parent-adolescent relationship when growing up; specifically a hostile relationship. These findings suggest that targeting parents, potentially through education, may help to limit problems related to simulated and traditional gambling behaviour amongst young people. However, these influences were not just restricted to parents, and were also evident from friends and other family members. Together, the results found that most factors related to engagement and problems with simulated gambling also related to engagement and problems with traditional gambling, and that targeting these factors may reduce harms for both. These factors were parent-adolescent relationship style (specifically hostile relationships), simulated gambling norms, motivations for gaming and the level of engagement with simulated gambling.

References

Abbott, M. W., Binde, P., Clark, L., Hodgins, D., Korn, D., Pereira, A., Quilty, L., Thomas, A., Volberg, R., Walker, D., & Williams, R. (2015). *Conceptual framework of harmful gambling: An international collaboration revised September 2015*. Gambling Research Exchange Ontario (GREO). https://prism.ucalgary.ca/handle/1880/51023

Abbott, M. W., & Volberg, R. A. (2000). *Taking the pulse on gambling and problem gambling in New Zealand: A report on phase one of the 1999 national prevalence survey*. Department of Internal Affairs Wellington.

Aiken, A., Clare, P. J., Wadolowski, M., Hutchinson, D., Najman, J. M., Slade, T., Bruno, R., McBride, N., Kypri, K., & Mattick, R. P. (2018). Age of Alcohol Initiation and Progression to Binge Drinking in Adolescence: A Prospective Cohort Study. *Alcoholism, Clinical and Experimental Research*, *42*(1), 100–110.

Ajilore, O., Amialchuk, A., & Egan, K. (2016). Alcohol consumption by youth: Peers, parents, or prices? *Economics and Human Biology*, *23*, 76–83.

Ajzen, I. (2006). *Constructing a theory of planned behavior questionnaire*. Amherst, MA. http://people.umass.edu/~aizen/pdf/tpb.measurement.pdf

Ajzen, I. (2020). The theory of planned behavior: Frequently asked questions. *Human Behavior and Emerging Technologies*, *2*(4), 314–324.

Albarrán Torres, C., & Goggin, G. (2014). Mobile social gambling: Poker's next frontier. *Mobile Media & Communication*, *2*(1), 94–109.

Ariyabuddhiphongs, V. (2013). Adolescent gambling: A narrative review of behavior and its predictors. *International Journal of Mental Health and Addiction*, *11*(1), 97–109.

Australian Bureau of Statistics. (2012). *4817.0.55.001 - Information Paper: Use of the Kessler Psychological Distress Scale in ABS Health Surveys, Australia, 2007-08*. Abs.Gov.Au. https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/4817.0.55.001Chapter92007-08

Australian Communications and Media Authority. (2019). *Communications report 2017-18*. https://www.acma.gov.au/sites/default/files/2019-08/Communications%20report%202017-18.pdf

Australian Communications and Media Authority. (2021). *Check if a gambling operator is legal*. Australian Communications and Media Authority. https://www.acma.gov.au/check-if-gambling-operator-legal

Australian Institute of Family Studies. (2016). *Gambling activity in Australia*. https://aifs.gov.au/agrc/publications/gambling-activity-australia/export

Babor, T. F., Higgins-Biddle, J. C., Saunders, J. B., & Monteiro, M. G. (1992). The alcohol use disorders identification test. *Guidelines for Use in Primary Health Care. Geneva: World Health Organization*. https://alcoholscreen.org/~auditscreen/cmsb/uploads/audit-manual_001.pdf

Baggio, S., Dupuis, M., Studer, J., Spilka, S., Daeppen, J.-B., Simon, O., Berchtold, A., & Gmel, G. (2016). Reframing video gaming and internet use addiction: empirical cross-national comparison of heavy use over time and addiction scales among young users. *Addiction*, *111*(3), 513–522.

Baker, T. B., Piper, M. E., McCarthy, D. E., Majeskie, M. R., & Fiore, M. C. (2004). Addiction motivation reformulated: an affective processing model of negative reinforcement. *Psychological review*, *111*(1), 33.

Bányai, F., Griffiths, M. D., Király, O., & Demetrovics, Z. (2018). The Psychology of Esports: A Systematic Literature Review. *Journal of Gambling Studies*. https://doi.org/10.1007/s10899-018-9763-1

Bellringer, M., Taylor, S., Savila, F., & Abbott, M. (2014). Gambling behaviours and associated familial influences among 9-year old Pacific children in New Zealand. *International Gambling Studies*, *14*(3), 457–471.

Billi, R., Stone, C. A., Marden, P., & Yeung, K. (2014). *The Victorian Gambling Study: A Longitudinal study of gambling and health in Victoria 2008-2012*. Victorian Responsible Gambling Foundation.

Binde, P., Romild, U., & Volberg, R. A. (2017). Forms of gambling, gambling involvement and problem gambling: evidence from a Swedish population survey. *International Gambling Studies*, *17*(3), 490–507.

Blackman, A., Browne, M., Rockloff, M., Hing, N., & Russell, A. M. T. (2019). Contrasting Effects of Gambling Consumption and Gambling Problems on Subjective Wellbeing. *Journal of Gambling Studies*. https://doi.org/10.1007/s10899-019-09862-z

Blaszczynski, A., & Nower, L. (2002). A pathways model of problem and pathological gambling. *Addiction*, *97*(5), 487–499.

Blaszczynski, A., Russell, A., Gainsbury, S., & Hing, N. (2016). Mental health and online, land-based and mixed gamblers. *Journal of Gambling Studies*, *32*(1), 261–275.

Blume, A. W. (2001). Negative reinforcement and substance abuse: Using a behavioural conceptualisation to enhance treatment. *The Behavior Analyst Today*, *2*(2), 86–90.

Brand, J. E., Todhunter, S., & Jervis, J. (2017). *Digital Australia Report 2018*. Interactive Games & Entertainment Association. https://www.igea.net/wp-content/uploads/2017/07/Digital-Australia-2018-DA18-Final-1.pdf

Browne, M., Goodwin, B. C., & Rockloff, M. J. (2017). Validation of the Short Gambling Harm Screen (SGHS): A Tool for Assessment of Harms from Gambling. *Journal of Gambling Studies*. https://doi.org/10.1007/s10899-017-9698-y

Browne, M., Hing, N., Rockloff, M., Russell, A. M. T., Greer, N., Nicoll, F., & Smith, G. (2019). A Multivariate Evaluation of 25 Proximal and Distal Risk-Factors for Gambling-Related Harm. *Journal of Clinical Medicine*, *8*(4), 509.

Browne, M., Rockloff, M., Hing, N., Russell, A., Murray Boyle, C., Rawat, V., Tran, K., Brook, K., & Sproston, K. (2019). *NSW Gambling Survey 2019*. NSW Responsible Gambling Fund.

Brühlmann, F., Vollenwyder, B., Opwis, K., & Mekler, E. D. (2018). Measuring the “Why” of Interaction: Development and Validation of the User Motivation Inventory (UMI). In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems* (pp. 1–13). Association for Computing Machinery.

Buchanan, T. W., McMullin, S. D., Baxley, C., & Weinstock, J. (2020). Stress and gambling. *Current Opinion in Behavioral Sciences*, *31*, 8–12.

Burke, K., Dittman, C. K., Haslam, D., & Ralph, A. (2021). Assessing critical dimensions of the parent-adolescent relationship from multiple perspectives: Development and validation of the Parent-Adolescent Relationship Scale (PARS). *Psychological Assessment*, *33*(5), 395–410.

Calado, F., Alexandre, J., & Griffiths, M. D. (2017). Prevalence of adolescent problem gambling: A systematic review of recent research. *Journal of Gambling Studies*, *33*(2), 397–424.

Calado, F., & Griffiths, M. D. (2016). Problem gambling worldwide: An update and systematic review of empirical research (2000-2015). *Journal of Behavioral Addictions*, *5*(4), 592–613.

Canale, N., Vieno, A., Ter Bogt, T., Pastore, M., Siciliano, V., & Molinaro, S. (2016). Adolescent gambling-oriented attitudes mediate the relationship between perceived parental knowledge and adolescent gambling: Implications for prevention. *Prevention Science*, *17*(8), 970–980.

Castrén, S., Grainger, M., Lahti, T., Alho, H., & Salonen, A. H. (2015). At-risk and problem gambling among adolescents: a convenience sample of first-year junior high school students in Finland. *Substance Abuse Treatment, Prevention, and Policy*, *10*, 9.

Chapple, C. L., & Johnson, K. A. (2007). Gender differences in impulsivity. *Youth Violence and Juvenile Justice*, *5*(3), 221–234.

Choo, H., Sim, T., Liau, A. K. F., Gentile, D. A., & Khoo, A. (2015). Parental influences on pathological symptoms of video-gaming among children and adolescents: A prospective study. *Journal of Child and Family Studies*, *24*(5), 1429–1441.

Clarke, D., Tse, S., Abbott, M. W., Townsend, S., Kingi, P., & Manaia, W. (2007). Reasons for starting and continuing gambling in a mixed ethnic community sample of pathological and non-problem gamblers. *International Gambling Studies*, *7*(3), 299–313.

Close, J., Spicer, S., Nicklin, L. L., Uther, M., Lloyd, J., & Lloyd, H. (2021). Secondary analysis of loot box data: are high-spending “whales” wealthy gamers or problem gamblers? *Addictive Behaviors*, *117*, 106851.

Cummings, W. T., & Corney, W. (1987). A conceptual model of gambling behavior: Fishbein’s Theory of Reasoned Action. *Journal of Gambling Behavior*, *3*(3), 190–201.

DeCamp, W. (2021). Loot boxes and gambling: Similarities and dissimilarities in risk and protective factors. *Journal of Gambling Studies*, *37*(1), 189–201.

Delfabbro, P., & Thrupp, L. (2003). The social determinants of youth gambling in South Australian adolescents. *Journal of Adolescence*, *26*(3), 313–330.

Delfabbro, P., Winefield, A. H., & Anderson, S. (2009). Once a gambler – always a gambler? A longitudinal analysis of gambling patterns in young people making the transition from adolescence to adulthood. *International Gambling Studies*, *9*(2), 151–163.

Diggs, O. N., Neppl, T. K., Jeon, S., & Lohman, B. J. (2017). The association of harsh parenting, parent-child communication, and parental alcohol use with male alcohol use into emerging adulthood. *The Journal of Adolescent Health*, *61*(6), 736–742.

Dowling, N. A., Jackson, A. C., Thomas, S. A., & Frydenberg, E. (2010). *Children at risk of developing problem gambling*. Gambling Research Australia. http://www.jogoremoto.pt/docs/extra/1HISat.pdf

Dowling, N. A., Merkouris, S. S., Greenwood, C. J., Oldenhof, E., Toumbourou, J. W., & Youssef, G. J. (2017). Early risk and protective factors for problem gambling: A systematic review and meta-analysis of longitudinal studies. *Clinical Psychology Review*, *51*, 109–124.

Dowling, N. A., Oldenhof, E., Shandley, K., Youssef, G. J., Vasiliadis, S., Thomas, S. A., ... & Jackson, A. C. (2018). The intergenerational transmission of problem gambling: The mediating role of offspring gambling expectancies and motives. *Addictive Behaviors*, *77*, 16-20.

Dowling, N. A., Shandley, K. A., Oldenhof, E., Affleck, J. M., Youssef, G. J., Frydenberg, E., ... & Jackson, A. C. (2017). The intergenerational transmission of at-risk/problem gambling: The moderating role of parenting practices. *The American Journal on Addictions*, *26*(7), 707-712.

Dowling, N. A., Shandley, K., Oldenhof, E., Youssef, G. J., Thomas, S. A., Frydenberg, E., & Jackson, A. C. (2016). The intergenerational transmission of problem gambling: The mediating role of parental psychopathology. *Addictive Behaviors*, *59*, 12–17.

Drummond, A., & Sauer, J. D. (2018). Video game loot boxes are psychologically akin to gambling. *Nature Human Behaviour*, *2*(8), 530–532.

Drummond, A., Sauer, J. D., Hall, L. C., Zendle, D., & Loudon, M. R. (2020). Why loot boxes could be regulated as gambling. *Nature Human Behaviour*, *4*(10), 986–988.

Dussault, F., Brunelle, N., Kairouz, S., Rousseau, M., Leclerc, D., Tremblay, J., Cousineau, M.-M., & Dufour, M. (2017). Transition from playing with simulated gambling games to gambling with real money: a longitudinal study in adolescence. *International Gambling Studies*, *17*(3), 386–400.

Ellery, M., & Stewart, S. H. (2014). Alcohol affects video lottery terminal (VLT) gambling behaviors and cognitions differently. *Psychology of Addictive Behaviors*, *28*(1), 206–216.

Ellery, M., Stewart, S. H., & Loba, P. (2005). Alcohol's effects on video lottery terminal (VLT) play among probable pathological and non-pathological gamblers. *Journal of Gambling Studies*, *21*(3), 299–324.

Environment and Communications References Committee, Australian Senate. (2018). *Gaming Micro-transactions for Chance-based Items*. Environment and Communications References Committee.

eSafety Commissioner. (2018). *State of Play - Youth and online Gaming in Australia*. https://www.esafety.gov.au/about-the-office/research-library/youth-online-gaming

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

Fiedler, I., Kairouz, S., Costes, J.-M., & Weißmüller, K. S. (2019). Gambling spending and its concentration on problem gamblers. *Journal of Business Research*, *98*, 82–91.

Flack, M., & Morris, M. (2015). Problem Gambling: One for the Money…? *Journal of Gambling Studies*, *31*(4), 1561–1578.

Flack, M., & Morris, M. (2016). The temporal stability and predictive ability of the Gambling Outcome Expectancies Scale (GOES): A prospective study. *Journal of Gambling Studies*, *32*(3), 923–933.

Flexon, J. L., Greenleaf, R. G., & Lurigio, A. J. (2012). The effects of self-control, gang membership, and parental attachment/identification on police contacts among Latino and African American youths. *International Journal of Offender Therapy and Comparative Criminology*, *56*(2), 218–238.

Floros, G. D. (2018). Gambling disorder in adolescents: prevalence, new developments, and treatment challenges. *Adolescent Health, Medicine and Therapeutics*, *9*, 43–51.

Forrest, D., & McHale, I. G. (2021). Transmission of Problem Gambling Between Adjacent Generations. *Journal of Gambling Studies, 37*(2), 711-722.

Fotti, S. A., Katz, L. Y., Afifi, T. O., & Cox, B. J. (2006). The associations between peer and parental relationships and suicidal behaviours in early adolescents. *Canadian Journal of Psychiatry. Revue Canadienne de Psychiatrie*, *51*(11), 698–703.

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*, *31*(4), 1531–1543.

Freund, M., Noble, N., Hill, D., White, V., Evans, T., Oldmeadow, C., & Sanson-Fisher, R. (2019). *The prevalence and correlates of gambling in secondary school students in Victoria, Australia, 2017*. Victorian Responsible Gambling Foundation. https://responsiblegambling.vic.gov.au/documents/680/Freund-Gambling-in-secondary-school-students-in-Victoria-2017-Oct-2019_Qu9AD8V.pdf

Fydrich, T., Geyer, M., Hessel, A., Sommer, G., & Brähler, E. (1999). Fragebogen zur Sozialen Unterstützung (F-SozU): Normierung an einer repräsentativen Stichprobe. In *Diagnostica* (Vol. 45, Issue 4, pp. 212–216). https://doi.org/10.1026//0012-1924.45.4.212

Gainsbury, S. M., Abarbanel, B., & Blaszczynski, A. (2017). Game on: Comparison of demographic profiles, consumption behaviors, and gambling site selection criteria of esports and sports bettors. *Gaming Law Review*, *21*(8), 575–587.

Gainsbury, S. M., King, D., Delfabbro, P., Hing, N., Russell, A. M. T., Blaszczynski, A., & Derevensky, J. (2015). *The use of social media in gambling*. Gambling Research Australia. https://infohub.gambleaware.org/wp-content/uploads/2016/03/grasocialmediareport.pdf

Gainsbury, S. M., King, D. L., Russell, A. M. T., & Delfabbro, P. (2016). Who Pays to Play Freemium Games? The Profiles and Motivations of Players Who Make Purchases Within Social Casino Games. *Journal of Behavioral Addictions*, *5*(2), 221–230.

Gainsbury, S. M., Russell, A., Blaszczynski, A., & Hing, N. (2015). Greater involvement and diversity of Internet gambling as a risk factor for problem gambling. *European Journal of Public Health*, *25*(4), 723–728.

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., Russell, A., Wood, R., Hing, N., & Blaszczynski, A. (2015). How risky is Internet gambling? A comparison of subgroups of Internet gamblers based on problem gambling status. *New Media & Society*, *17*(6), 861–879.

Gambling Commission. (2017). *Young People & Gambling 2017 - A research study among 11-16 year olds in Great Britain*. http://www.gamblingcommission.gov.uk/PDF/survey-data/Young-People-and-Gambling-2017-Report.pdf

Gong, L., & Rodda, S. N. (2020). An exploratory study of individual and parental techniques for limiting loot box consumption. *International Journal of Mental Health and Addiction*, 1-28.

Goodie, A. S., & Fortune, E. E. (2013). Measuring cognitive distortions in pathological gambling: review and meta-analyses. *Psychology of Addictive Behaviors*, *27*(3), 730–743.

Goodwin, B., Browne, M., Hing, N., & Russell, A. (2017). Applying a revised two-factor model of impulsivity to predict health behaviour and well-being. *Personality and Individual Differences*, *111*, 250–255.

Granic, I., Lobel, A., & Engels, R. C. (2014). The benefits of playing video games. *American Psychologist*, *69*(1), 66.

Grant, J. E., & Kim, S. W. (2005). Quality of life in kleptomania and pathological gambling. *Comprehensive Psychiatry*, *46*(1), 34–37.

Gray, P. (2015). Cognitive benefits of playing video games. *Psychology Today*.

Greene, G. (2015). When fantasy becomes reality: Attempts to regulate the highly unregulated daily fantasy sports industry. *St Mary's Law Journal*, *47*, 821.

Greer, N., Rockloff, M., Browne, M., Hing, N., & King, D. L. (2019). Esports betting and skin gambling: A brief history. *Journal of Gambling Issues*, *43*. https://doi.org/10.4309/jgi.2019.43.8

Greer, N., Rockloff, M., & Russell, A. M. T. (2021). *Gambling and video games: are esports betting and skin gambling associated with greater gambling involvement and harm?* Victorian Responsible Gambling Foundation. https://responsiblegambling.vic.gov.au/resources/publications/gambling-and-video-games-are-esports-betting-and-skin-gambling-associated-with-greater-gambling-involvement-and-harm-967/

Griffiths, M. D. (2019). The therapeutic and health benefits of playing video games. In *The Oxford Handbook of Cyberpsychology*.

Griffiths, M. D., Van Rooij, A. J., Kardefelt-Winther, D., Starcevic, V., Király, O., Pallesen, S., ... & Demetrovics, Z. (2016). Working towards an international consensus on criteria for assessing Internet gaming disorder: A critical commentary on Petry et al.(2014). *Addiction*, *111*(1), 167.

Griffiths, M., & Wood, R. T. (2000). Risk factors in adolescence: the case of gambling, videogame playing, and the internet. *Journal of Gambling Studies*, *16*(2–3), 199–225.

Grove, C. (2016). *Understanding skin gambling*. Retrieved from https://www.thelines.com/wp-content/uploads/2018/03/Skin-Gambling-White-Paper-V2.pdf

Gupta, R., & Derevensky, J. L. (1997). Familial and social influences on juvenile gambling behavior. *Journal of Gambling Studies*, *13*(3), 179–192.

Gupta, R., & Derevensky, J. L. (1998). An Empirical Examination of Jacobs' General Theory of Addictions: Do Adolescent Gamblers Fit the Theory? *Journal of Gambling Studies*, *14*(1), 17–49.

Hamari, J., Alha, K., Järvelä, S., Kivikangas, J. M., Koivisto, J., & Paavilainen, J. (2017). Why do players buy in-game content? An empirical study on concrete purchase motivations. *Computers in Human Behavior*, *68*, 538–546.

Hardenstein, T. S. (2017). Skins in the Game: Counter-Strike, Esports, and the Shady World of Online Gambling. *UNLV Gaming LJ*. https://heinonline.org/hol-cgi-bin/get_pdf.cgi?handle=hein.journals/unlvgalj7&section=14

Hardoon, K. K., Gupta, R., & Derevensky, J. L. (2004). Psychosocial variables associated with adolescent gambling. *Psychology of Addictive Behaviors*, *18*(2), 170–179.

Hare, S. (2015). Study of gambling and health in Victoria. *Victorian Responsible Gambling Foundation*. https://apo.org.au/node/59171

Harries, M. D., Redden, S. A., Leppink, E. W., Chamberlain, S. R., & Grant, J. E. (2017). Sub-clinical alcohol consumption and gambling disorder. *Journal of Gambling Studies*, *33*(2), 473–486.

Hayer, T., Kalke, J., Meyer, G., & Brosowski, T. (2018). Do Simulated Gambling Activities Predict Gambling with Real Money During Adolescence? Empirical Findings from a Longitudinal Study. *Journal of Gambling Studies*, *34*(3), 929–947.

Hilvert-Bruce, Z., Neill, J. T., Sjöblom, M., & Hamari, J. (2018). Social motivations of live-streaming viewer engagement on Twitch. *Computers in Human Behavior*, *84*, 58–67.

Hing, N., & Russell, A. M. T. (2019). Proximal and distal risk factors for gambling problems specifically associated with Electronic Gaming Machines. *Journal of Gambling Studies*. https://doi.org/10.1007/s10899-019-09867-8

Hing, N., Russell, A. M. T., King, D., Rockloff, M., Browne, M., Greer, N., Newall, P., Sproston, K., Chen, L., & Coughlin, S. (2021). *NSW Youth Gambling Study 2020*. Office of Responsible Gambling (NSW). https://apo.org.au/node/310975

Hing, N., Russell, A. M. T., Rockloff, M., Browne, M., Langham, E., L, L. E. L., Greer, N., Thomas, A., Jenkinson, R., Rawat, V., & Thorne, H. (2018). *Effects of wagering marketing on vulnerable adults*. Victorian Responsible Gambling Foundation. http://responsiblegambling.vic.gov.au/resources/publications/effects-of-wagering-marketing-on-vulnerable-adults-408/

Hing, N., Russell, A. M. T., Vitartas, P., & Lamont, M. (2016). Demographic, behavioural and normative risk factors for gambling problems amongst sports bettors. *Journal of Gambling Studies*, *32*(2), 625–641.

Hing, N., Russell, A., Tolchard, B., & Nower, L. (2016). Risk Factors for Gambling Problems: An Analysis by Gender. *Journal of Gambling Studies*, *32*(2), 511–534.

Hing, N., Vitartas, P., Lamont, M., & Fink, E. (2014). Adolescent exposure to gambling promotions during televised sport: an exploratory study of links with gambling intentions. *International Gambling Studies*, *14*(3), 374–393.

Hollingshead, S. J., Kim, H. S., Rockloff, M., McGrath, D. S., Hodgins, D. C., & Wohl, M. J. A. (2020). Motives for playing social casino games and the transition from gaming to gambling (or vice versa): social casino game play as harm reduction? *Journal of Gambling Issues*. https://doi.org/10.4309/jgi.2021.46.4

Holt-Lunstad, J., Smith, T. B., & Layton, J. B. (2010). Social relationships and mortality risk: a meta-analytic review. *PLoS Medicine*, *7*(7), e1000316.

International Wellbeing Group. (2013). *Personal Wellbeing Index: 5th Edition*. Centre on Quality of Life, Deakin University.

Ipsos MORI. (2019). *Young people and gambling survey 2019: A research study among 11-16 year olds in Great Britain*. UK Gambling Commission.

Jacques, C., Fortin-Guichard, D., Bergeron, P.-Y., Boudreault, C., Lévesque, D., & Giroux, I. (2016). Gambling Content in Facebook Games. *Computers in Human Behavior*, *57*(C), 48–53.

Johansson, A., Grant, J. E., Kim, S. W., Odlaug, B. L., & Götestam, K. G. (2009). Risk factors for problematic gambling: a critical literature review. *Journal of Gambling Studies*, *25*(1), 67–92.

Kessler, R. C., Green, J. G., Gruber, M. J., Sampson, N. A., Bromet, E., Cuitan, M., Furukawa, T. A., Gureje, O., Hinkov, H., Hu, C.-Y., Lara, C., Lee, S., Mneimneh, Z., Myer, L., Oakley-Browne, M., Posada-Villa, J., Sagar, R., Viana, M. C., & Zaslavsky, A. M. (2010). Screening for serious mental illness in the general population with the K6 screening scale: results from the WHO World Mental Health (WMH) survey initiative. *International Journal of Methods in Psychiatric Research*, *19 Suppl 1*, 4–22.

Khurana, A., Bleakley, A., Jordan, A. B., & Romer, D. (2015). The protective effects of parental monitoring and Internet restriction on adolescents' risk of online harassment. *Journal of Youth and Adolescence*, *44*(5), 1039–1047.

Kim, H. S., Wohl, M. J. A., Gupta, R., & Derevensky, J. L. (2017). Why do young adults gamble online? A qualitative study of motivations to transition from social casino games to online gambling. *Asian Journal of Gambling Issues and Public Health*, *7*(1), 6.

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*, *31*(4), 1819–1831.

King, D. L. (2018). *Online gaming and gambling in children and adolescents – Normalising gambling in cyber places*. Victorian Responsible Gambling Foundation.

https://responsiblegambling.vic.gov.au/resources/publications/online-gaming-and-gambling-in-children-and-adolescents-normalising-gambling-in-cyber-places-479/

King, D. L., Delfabbro, P., & Griffiths, M. (2010). The convergence of gambling and digital media: implications for gambling in young people. *Journal of Gambling Studies*, *26*(2), 175–187.

King, D. L., & Delfabbro, P. H. (2016). Early exposure to digital simulated gambling: A review and conceptual model. *Computers in Human Behavior*, *55, Part A*, 198–206.

King, D. L., & Delfabbro, P. H. (2017). Features of Parent-Child Relationships in Adolescents with Internet Gaming Disorder. *International Journal of Mental Health and Addiction*, *15*(6), 1270–1283.

King, D. L., & Delfabbro, P. H. (2019). Video Game Monetization (eg,'Loot Boxes'): a Blueprint for Practical Social Responsibility Measures. *International Journal of Mental Health and Addiction*, *17*(1), 166–179.

King, D. L., & Delfabbro, P. H. (2020). The convergence of gambling and monetised gaming activities. *Current Opinion in Behavioral Sciences*, *31*, 32–36.

King, D. L., Delfabbro, P. H., Derevensky, J. L., & Griffiths, M. D. (2012). A review of Australian classification practices for commercial video games featuring simulated gambling. *International Gambling Studies*, *12*(2), 231–242.

King, D. L., Delfabbro, P. H., Kaptsis, D., & Zwaans, T. (2014). Adolescent simulated gambling via digital and social media: An emerging problem. *Computers in Human Behavior*, *31*, 305–313.

King, D. L., Delfabbro, P. H., Zwaans, T., & Kaptsis, D. (2013). Clinical features and axis I comorbidity of Australian adolescent pathological Internet and video game users. *The Australian and New Zealand Journal of Psychiatry*, *47*(11), 1058–1067.

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.

Kliem, S., Mößle, T., Rehbein, F., Hellmann, D. F., Zenger, M., & Brähler, E. (2015). A brief form of the Perceived Social Support Questionnaire (F-SozU) was developed, validated, and standardized. *Journal of Clinical Epidemiology*, *68*(5), 551–562.

Kotwani. B. (2021). *Most expensive CSGO skin sold for a record $150k USD*. Retrieved from https://www.talkesport.com/news/csgo/most-expensive-csgo-skin-sold-for-a-record-150k-usd/

Kristiansen, S., & Severin, M. C. (2020). Exploring groups of simulated gambling behaviour: a typological study among Danish adolescents. *International Gambling Studies*, *20*(1), 135–150.

Kristiansen, S., & Trabjerg, C. M. (2017). Legal gambling availability and youth gambling behaviour: A qualitative longitudinal study. *International Journal of Social Welfare*, *26*(3), 218–229.

Laird, Y., Fawkner, S., Kelly, P., McNamee, L., & Niven, A. (2016). The role of social support on physical activity behaviour in adolescent girls: a systematic review and meta-analysis. *The International Journal of Behavioral Nutrition and Physical Activity*, *13*, 79.

Langham, E., Thorne, H., Browne, M., Donaldson, P., Rose, J., & Rockloff, M. (2016). Understanding gambling related harm: a proposed definition, conceptual framework, and taxonomy of harms. *BMC Public Health*, *16*, 80.

Lawrence, D., Johnson, S., Hafekost, J., Boterhoven de Haan, K., Sawyer, M., Ainley, J., & Zubrick, S. R. (2015). *The Mental Health of Children and Adolescents : Report on the second Australian Child and Adolescent Survey of Mental Health and Wellbeing*. https://research.acer.edu.au/well_being/1/

Leeman, R. F., Patock-Peckham, J. A., Hoff, R. A., Krishnan-Sarin, S., Steinberg, M. A., Rugle, L. J., & Potenza, M. N. (2014). Perceived parental permissiveness toward gambling and risky behaviors in adolescents. *Journal of Behavioral Addictions*, *3*(2), 115–123.

Lemmens, J. S., Valkenburg, P. M., & Gentile, D. A. (2015). The Internet Gaming Disorder Scale. *Psychological Assessment*, *27*(2), 567–582.

Leung, R. K., Toumbourou, J. W., & Hemphill, S. A. (2014). The effect of peer influence and selection processes on adolescent alcohol use: a systematic review of longitudinal studies. *Health Psychology Review*, *8*(4), 426–457.

Liau, A. K., Choo, H., Li, D., Gentile, D. A., Sim, T., & Khoo, A. (2015). Pathological video-gaming among youth: A prospective study examining dynamic protective factors. *Addiction Research & Theory*, *23*(4), 301–308.

Livingstone, C. (2005). Desire and the consumption of danger: Electronic gaming machines and the commodification of interiority. *Addiction Research & Theory*, *13*(6), 523–534.

Macey, J., & Hamari, J. (2018). Investigating relationships between video gaming, spectating esports, and gambling. *Computers in Human Behavior*, *80*, 344–353.

Macey, J., & Hamari, J. (2019). eSports, skins and loot boxes: Participants, practices and problematic behaviour associated with emergent forms of gambling. *New Media & Society*, *21*(1), 20–41.

Magoon, M. E., & Ingersoll, G. M. (2006). Parental modeling, attachment, and supervision as moderators of adolescent gambling. *Journal of Gambling Studies*, *22*(1), 1–22.

Marchica, L., & Derevensky, J. (2016). Fantasy Sports: A Growing Concern Among College Student-Athletes. *International Journal of Mental Health and Addiction*, *14*(5), 635–645.

Marchica, L., Zhao, Y., Derevensky, J., & Ivoska, W. (2017). Understanding the Relationship Between Sports-Relevant Gambling and Being At-Risk for a Gambling Problem Among American Adolescents. *Journal of Gambling Studies*, *33*(2), 437–448.

McComb, J. L., & Sabiston, C. M. (2010). Family influences on adolescent gambling behavior: a review of the literature. *Journal of Gambling Studies*, *26*(4), 503–520.

Meehan, J. C. (2015). The Predominate Goliath: Why Pay-to-Play Daily Fantasy Sports are Games of Skill Under the Dominant Factor Test. *Marquette Sports Law Review*, *26*, 5.

Meisel, M. K., Clifton, A. D., Mackillop, J., Miller, J. D., Campbell, W. K., & Goodie, A. S. (2013). Egocentric social network analysis of pathological gambling. *Addiction*, *108*(3), 584–591.

Moccia, L., Pettorruso, M., De Crescenzo, F., De Risio, L., Di Nuzzo, L., Martinotti, G., ... & Di Nicola, M. (2017). Neural correlates of cognitive control in gambling disorder: a systematic review of fMRI studies. *Neuroscience & Biobehavioral Reviews*, *78*, 104-116.

Molde, H., Holmøy, B., Merkesdal, A. G., Torsheim, T., Mentzoni, R. A., Hanns, D., Sagoe, D., & Pallesen, S. (2018). Are video games a gateway to gambling? A longitudinal study based on a representative Norwegian sample. *Journal of Gambling Studies*. https://doi.org/10.1007/s10899-018-9781-z

Myrseth, H., Notelaers, G., Strand, L. Å., Borud, E. K., & Olsen, O. K. (2017). Introduction of a new instrument to measure motivation for gaming: the electronic gaming motives questionnaire. *Addiction*, *112*(9), 1658–1668.

Neal, P. N., Delfabbro, P. H., & O'Neil, M. G. (2005). *Problem gambling and harm: Towards a national definition*. https://hekyll.services.adelaide.edu.au/dspace/handle/2440/40558

Nicklin, L. L., Spicer, S. G., Close, J., Parke, J., Smith, O., Raymen, T., Lloyd, H., & Lloyd, J. (2021). 'it's the attraction of winning that draws you in'-A qualitative investigation of reasons and facilitators for videogame loot box engagement in UK gamers. *Journal of Clinical Medicine Research*, *10*(10), 2103.

Office for Problem Gambling. (2013). *Gambling Prevalence in South Australia (2012)*.

Pagani, L. S., Derevensky, J. L., & Japel, C. (2009). Predicting gambling behavior in sixth grade from kindergarten impulsivity: a tale of developmental continuity. *Archives of Pediatrics & Adolescent Medicine*, *163*(3), 238–243.

Pantazis, C. B., Gonzalez, L. A., Tunstall, B. J., Carmack, S. A., Koob, G. F., & Vendruscolo, L. F. (2021). Cues conditioned to withdrawal and negative reinforcement: Neglected but key motivational elements driving opioid addiction. *Science Advances*, *7*(15), eabf0364.

Parent Zone. (2018). *Skin gambling: teenage Britain's secret habit*. https://parentzone.org.uk/skingambling

Petry, N. M., Rehbein, F., Gentile, D. A., Lemmens, J. S., Rumpf, H.-J., Mößle, T., Bischof, G., Tao, R., Fung, D. S. S., Borges, G., Auriacombe, M., González Ibáñez, A., Tam, P., & O'Brien, C. P. (2014). An international consensus for assessing internet gaming disorder using the new DSM-5 approach. *Addiction*, *109*(9), 1399–1406.

Phillips, J. G., & Ogeil, R. P. (2007). Alcohol consumption and computer blackjack. *The Journal of General Psychology*, *134*(3), 333–353.

Pitt, H., Thomas, S. L., Bestman, A., Daube, M., & Derevensky, J. (2017a). What do children observe and learn from televised sports betting advertisements? A qualitative study among Australian children. *Australian and New Zealand Journal of Public Health*, *41*(6), 604–610.

Pitt, H., Thomas, S. L., Bestman, A., Daube, M., & Derevensky, J. L. (2017b). Factors that influence children's gambling attitudes and consumption intentions: lessons for gambling harm prevention research, policies and advocacy strategies. *Harm Reduction Journal*, *14*(1), 11.

Potenza, M. N., Steinberg, M. A., Skudlarski, P., Fulbright, R. K., Lacadie, C. M., Wilber, M. K., Rounsaville, B. J., Gore, J. C., & Wexler, B. E. (2003). Gambling urges in pathological gambling: a functional magnetic resonance imaging study. *Archives of General Psychiatry*, *60*(8), 828–836.

Przybylski, A. K., Murayama, K., DeHaan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. *Computers in Human Behavior*, *29*(4), 1841–1848.

Putnick, D. L., Bornstein, M. H., Lansford, J. E., Malone, P. S., Pastorelli, C., Skinner, A. T., Sorbring, E., Tapanya, S., Uribe Tirado, L. M., Zelli, A., Alampay, L. P., Al-Hassan, S. M., Bacchini, D., Bombi, A. S., Chang, L., Deater-Deckard, K., Di Giunta, L., Dodge, K. A., & Oburu, P. (2015). Perceived mother and father acceptance-rejection predict four unique aspects of child adjustment across nine countries. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *56*(8), 923–932.

Räsänen, T., Lintonen, T., Tolvanen, A., & Konu, A. (2016). Social support as a mediator between problem behaviour and gambling: a cross-sectional study among 14–16-year-old Finnish adolescents. *BMJ Open*, *6*(12), e012468.

Raylu, N., & Oei, T. P. S. (2004). The gambling urge scale: development, confirmatory factor validation, and psychometric properties. *Psychology of Addictive Behaviors*, *18*(2), 100–105.

Rehbein, F., & Baier, D. (2013). Family-, media-, and school-related risk factors of video game addiction: A 5-year longitudinal study. *Journal of Media Psychology: Theories, Methods, and Applications*, *25*(3), 118–128.

Responsible Gambling Strategy Board. (2018). *Children, young people and gambling: A case for action*. https://www.rgsb.org.uk/PDF/Gambling-and-children-and-young-people-2018.pdf

Riley, B. J., Oster, C., Rahamathulla, M., & Lawn, S. (2021). Attitudes, Risk Factors, and Behaviours of Gambling among Adolescents and Young People: A Literature Review and Gap Analysis. *International Journal of Environmental Research and Public Health*, *18*(3), 984.

Rockloff, M., Browne, M., Greer, N., Armstrong, T., & Thorne, H. (2020). Mobile EGM Games: Evidence That Simulated Games Encourage Real-Money Gambling. *Journal of Gambling Studies*, *36*(4), 1253–1265.

Rockloff, M., Browne, M., Hing, N., Thorne, H., Russell, A., Greer, N., Tran, K., Brook, K., & Sproston, K. (2020). *Victorian population gambling and health study 2018--2019*. Victorian Responsible Gambling Foundation. https://apo.org.au/node/303669

Rockloff, M. J., Browne, M., Russell, A. M. T., Merkouris, S. S., & Dowling, N. A. (2019). A quantification of the net consumer surplus from gambling participation. *Journal of Gambling Studies*, *35*(4), 1147-1162.

Rockloff, M., Russell, A. M. T., Greer, N., Lolé, L., Hing, N., & Browne, M. (2020). *Loot boxes: Are they grooming youth for gambling*. CQUniversity Australia. https://austgamingcouncil.org.au/sites/default/files/2020-08/AGC%20LR%20-%20Loot%20Boxes_%20Are%20they%20grooming%20youth%20for%20gambling_.pdf

Rockloff, M., Russell, A. M. T., Greer, N., Lole, L., Hing, N., & Browne, M. (2021). Young people who purchase loot boxes are more likely to have gambling problems: An online survey of adolescents and young adults living in NSW Australia. *Journal of Behavioral Addictions*. https://doi.org/10.1556/2006.2021.00007

Rose, I. N. (2015). Are Daily Fantasy Sports Legal? *Gaming Law Review and Economics*, *19*(5), 346–349.

Russell, A. M. T., Armstrong, T., Rockloff, M., Greer, N., Hing, N., & Browne, M. (2020). *Exploring the changing landscape of gambling in childhood, adolescence and young adulthood*. CQUniversity. https://www.alexmtrussell.com.au/s/R14-2020-Russell-Armstrong-Rockloff-Greer-Hing-Browne-Exploring-the-changing-landscapes-of-gambling.pdf

Russell, A. M. T., Browne, M., Hing, N., Rockloff, M., & Newall, P. (2021). Are any samples representative or unbiased? Reply to Pickering and Blaszczynski. *International Gambling* Studies Preprint: https://doi.org/10.31234/osf.io/wpdfy

Russell, A. M. T., Hing, N., & Browne, M. (2019). Risk Factors for Gambling Problems Specifically Associated with Sports Betting. *Journal of Gambling Studies*. https://doi.org/10.1007/s10899-019-09848-x

Russell, A. M. T., Hing, N., Li, E., & Vitartas, P. (2019). Gambling Risk Groups are Not All the Same: Risk Factors Amongst Sports Bettors. *Journal of Gambling Studies*, *35*(1), 225–246.

Russell, A. M. T., Langham, E., & Hing, N. (2018). Social influences normalize gambling-related harm among higher risk gamblers. *Journal of Behavioral Addictions*, *7*(4), 1100–1111.

Russell, A. M. T., Langham, E., Hing, N., & Rawat, V. (2018). *Social influences on gamblers by risk group: An egocentric social network analysis*. Victorian Responsible Gambling Foundation. https://responsiblegambling.vic.gov.au/resources/publications/social-influences-on-gamblers-by-risk-group-an-egocentric-social-network-analysis-411/

Ryan, R. M., Rigby, C. S., & Przybylski, A. (2006). The Motivational Pull of Video Games: A Self-Determination Theory Approach. *Motivation and Emotion*, *30*(4), 344–360.

Samarnggoon, K., & Kunkhet, A. (2019). An Investigation of Monetisation Models in Digital Games. *2019 Joint International Conference on Digital Arts, Media and Technology with ECTI Northern Section Conference on Electrical, Electronics, Computer and Telecommunications Engineering (ECTI DAMT-NCON)*, 64–68.

Sanders, M. R., Kirby, J. N., Tellegen, C. L., & Day, J. J. (2014). The Triple P-Positive Parenting Program: A systematic review and meta-analysis of a multi-level system of parenting support. *Clinical Psychology Review*, *34*(4), 337–357.

Schneider, L. A., King, D. L., & Delfabbro, P. H. (2017). Family factors in adolescent problematic Internet gaming: A systematic review. *Journal of Behavioral Addictions*, *6*(3), 321–333.

Schüll, N. D. (2012). *Addiction by design: Machine gambling in Las Vegas*. Princeton University Press.

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.

Sharpe, L. (2002). A reformulated cognitive–behavioral model of problem gambling: A biopsychosocial perspective. *Clinical Psychology Review*, *22*(1), 1–25.

Shead, N. W., Derevensky, J. L., & Gupta, R. (2010). Risk and protective factors associated with youth problem gambling. *International Journal of Adolescent Medicine and Health*, *22*(1), 39–58.

Silk, J. S., Stroud, L. R., Siegle, G. J., Dahl, R. E., Lee, K. H., & Nelson, E. E. (2012). Peer acceptance and rejection through the eyes of youth: pupillary, eyetracking and ecological data from the Chatroom Interact task. *Social Cognitive and Affective Neuroscience*, *7*(1), 93–105.

Sirola, A., Kaakinen, M., & Oksanen, A. (2018). Excessive gambling and online gambling communities. *Journal of Gambling Studies*, *34*(4), 1313–1325.

Sirola, A., Kaakinen, M., Savolainen, I., & Oksanen, A. (2019). Loneliness and online gambling-community participation of young social media users. *Computers in Human Behavior*, *95*, 136–145.

Sjöblom, M., Törhönen, M., Hamari, J., & Macey, J. (2017). Content structure is king: An empirical study on gratifications, game genres and content type on Twitch. *Computers in Human Behavior*, *73*, 161–171.

Steinberg, L., Sharp, C., Stanford, M. S., & Tharp, A. T. (2013). New tricks for an old measure: the development of the Barratt Impulsiveness Scale-Brief (BIS-Brief). *Psychological Assessment*, *25*(1), 216–226.

Thomas, S., Pitt, H., Bestman, A., Randle, M., Daube, M., & Pettigrew, S. (2016). Child and parent recall of gambling sponsorship in Australian sport. *Victoria: Victorian Responsible Gambling Foundation*. https://responsiblegambling.vic.gov.au/documents/67/Research-report-child-parent-recall-gambling-sponsorship.pdf

Toce-Gerstein, M., Gerstein, D. R., & Volberg, R. A. (2009). The NODS-CLiP: a rapid screen for adult pathological and problem gambling. *Journal of Gambling Studies*, *25*(4), 541–555.

Tymula, A., Rosenberg Belmaker, L. A., Roy, A. K., Ruderman, L., Manson, K., Glimcher, P. W., & Levy, I. (2012). Adolescents' risk-taking behavior is driven by tolerance to ambiguity. *Proceedings of the National Academy of Sciences - PNAS*, *109*(42), 17135–17140.

UK Gambling Commission. (2018). *Young People and Gambling*. https://www.gamblingcommission.gov.uk/pdf/survey-data/young-people-and-gambling-2018-report.pdf

Vachon, J., Vitaro, F., Wanner, B., & Tremblay, R. E. (2004). Adolescent gambling: relationships with parent gambling and parenting practices. *Psychology of Addictive Behaviors*, *18*(4), 398–401.

Wang, J., Liu, R.-D., Ding, Y., Liu, Y., Xu, L., & Zhen, R. (2017). What influences Chinese adolescents' choice intention between playing online games and learning? Application of Theory of Planned Behavior with subjective norm manipulated as peer support and parental monitoring. *Frontiers in Psychology*, *8*, 589.

Wardle, H. (2019). The same or different? Convergence of skin gambling and other gambling among children. *Journal of Gambling Studies*. https://doi.org/10.1007/s10899-019-09840-5

Wardle, H., & Zendle, D. (2021). Loot boxes, gambling, and problem gambling among young people: Results from a cross-sectional online survey. *Cyberpsychology, Behavior and Social Networking*, *24*(4), 267–274.

Warren, D., & Yu, M. (2019). Gambling activity among teenagers and their parents. In *LSAC Annual Statistical Report 2018*.

Wickwire, E., Whelan, J. P., Meyers, A. W., & Murray, D. M. (2007). Environmental correlates of gambling behavior in urban adolescents. *Journal of Abnormal Child Psychology*, *35*(2), 179–190.

Williams, R., West, B., & Simpson, R. (2012). *Prevention of problem gambling: A comprehensive review of the evidence and identified best practices*. https://www.uleth.ca/dspace/bitstream/handle/10133/3121/2012-PREVENTION-OPGRC.pdf

Williams, R., & Wood, R. T. (2007). The proportion of Ontario gambling revenue derived from problem gamblers. *Canadian Public Policy*, *33*(3), 367–387.

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.

Wood, M. D., Read, J. P., Mitchell, R. E., & Brand, N. H. (2004). Do parents still matter? Parent and peer influences on alcohol involvement among recent high school graduates. *Psychology of Addictive Behaviors*, *18*(1), 19–30.

Wood, R. T., & Williams, R. J. (2009). *Internet Gambling: Prevalence, Patterns, Problems, and Policy Options; Final Report prepared for the Ontario Problem Gambling Research Centre*. Ontario Problem Gambling Research Centre.

Wulf, T., Schneider, F. M., & Beckert, S. (2020). Watching players: An exploration of media enjoyment on Twitch. *Games and Culture*, *15*(3), 328–346.

Yap, M. B., Lawrence, K. A., Rapee, R. M., Cardamone-Breen, M. C., Green, J., & Jorm, A. F. (2017). Partners in parenting: A multi-level web-based approach to support parents in prevention and early intervention for adolescent depression and anxiety. *JMIR Mental Health*, *4*(4), e59.

Young, M., Abu-Duhou, I., Barnes, T., Creed, E., Morris, M., Stevens, M., & Tyler, B. (2006). *Northern Territory 2005 Gambling Prevalence Survey*. Uniprint NT, Charles Darwin University.

Zendle, D., & Cairns, P. (2018). Video game loot boxes are linked to problem gambling: Results of a large-scale survey. *PloS One*, *13*(11), e0206767.

Zendle, D., & Cairns, P. (2019). Loot boxes are again linked to problem gambling: Results of a replication study. *PloS One*, *14*(3), e0213194.

Zendle, D., Cairns, P., Barnett, H., & McCall, C. (2020). Paying for loot boxes is linked to problem gambling, regardless of specific features like cash-out and pay-to-win. *Computers in Human Behavior*, *102*, 181–191.

Zendle, D., Meyer, R., & Over, H. (2019). Adolescents and loot boxes: links with problem gambling and motivations for purchase. *Royal Society Open Science*, *6*(6), 190049.

Appendices

Survey instrument

Short_intro1
Thank you for your interest in this study.

We are collecting data about gambling and video games to help researchers, policy makers, and other key stakeholders to get a better understanding of how people engage in these activities.
The project is funded by the Victorian Responsible Gambling Foundation, and is being conducted by researchers from CQUniversity, led by Dr Alex Russell. If you have any queries, please contact a.m.russell@cqu.edu.au .
The survey asks about any gaming or gambling that you have done at any point in your life and in the last 12 months, as well as some questions about you. Your responses are completely anonymous.
The survey takes about 20 minutes to complete, depending on your answers. Your participation is voluntary and you can stop at any time during the survey by closing your browser window. You can continue the survey from where you left off by using the same device and browser. If you opt out part way through the survey, we will not retain any responses.

CQUniversity ethics approval no: 0000022525

Short_intro2
Would you like to see more details about the study?

- Yes, please show me more details (1)
- I do not wish to see more details - please take me to the consent form (2)

Info_sheet
From adolescence to young adulthood: Risk factors in transitions from gaming to gambling-related harm.

Project team: Dr Alex Russell (Principal Researcher), Professor Nerilee Hing (Project Mentor), Dr Philip Newall, Nancy Greer, and Dr Cassy Dittman.

INFORMATION SHEET

Thanks for your interest in this project examining the behaviour of young people in relation to gambling and gambling-like games. It is funded by the Victorian Responsible Gambling Foundation and conducted by Central Queensland University. Results will be used to inform harm prevention and minimisation strategies for gambling.

What you will be asked to do

Participation requires completing an online survey which should take around 20 minutes.
We will ask you some questions about yourself and any gambling and video gaming activities that you have done, both in the last 12 months and in your lifetime. We will also ask about any exposure to gambling during childhood and adolescence, and any problems or harms arising from your gaming or gambling.

How your confidentiality will be protected

Your survey responses will be completely anonymous, and we will not ask for your name or any identifying information. Your responses will be combined with hundreds of other survey responses so no one will be able to tell what your individual answers were.

The anonymous data will be kept securely by CQUniversity for potential further analysis. The de-identified data (the data collected without any way of identifying you) will be data warehoused and may be used by other researchers in the future. These researchers would need to supply an appropriate research proposal and have obtained approval from the Human Research Ethics Committee before access to the de-identified data would be given.

Your rights

Your participation in this study is completely voluntary. Should you wish to withdraw at any stage you are free to do so, up until you submit the survey. Once you have submitted the final question in the survey, we cannot remove your responses because they are anonymous, but you can withdraw at any point up until that time.

How you will receive feedback

This research is being conducted for CQUniversity. We will publicise our aggregated findings at facebook.com/cquegrl

Results will be published in a research report for the Victorian Responsible Gambling Foundation, and in subsequent journal articles.

Where you can get further information

If you want further information or have any questions, please contact the Principal Researcher (Dr Alex Russell) on a.m.russell@cqu.edu.au. If you have any ethical concerns about this research you are welcome to contact the Ethics and Compliance Officer at the Office of Research on +61 7 4923 2603 or at ethics@cqu.edu.au.

Some of the questions may be sensitive in nature. If gambling is currently an issue for you, please call the Gambling Helpline on 1800 858 858 or go to www.gamblinghelponline.org.au. Help is available 24/7 and is 100% confidential. If any of the survey questions raise issues for you, please call Lifeline on 13 11 14 for help.

If you would like to participate, you will be asked to indicate that you have read and understood this information by checking the acknowledgement accompanying the consent form. You will then be asked some questions to determine your eligibility and, if selected, you can then take part in our online survey. Qualtrics is helping us to recruit participants for this study.

Consent
*I consent to participation in this research project and agree that:

- I have read and understood the Information Sheet that describes this study
- Any questions I had about the project were answered by either the Information Sheet or by the researchers
- I understand I have the right to withdraw from the survey any time
- The research findings, which will not identify me, will be included in the researchers' publication(s) on the project which may include conference presentations and research articles as well as other media described in the Information Sheet
- To protect my privacy, my name will not be used in publication(s)
- I am providing informed consent to participate in this project
- I am 18 years of age or over
- Yes (1)
- No (2)

Pay_Attn
This survey includes questions that check if you're paying attention. Please read each question carefully.

Age
What is your current age? (Please enter numerals only)

Gender
What is your gender?

- Male (1)
- Female (2)
- Other (3)

Postcode
What is the postcode of your primary place of residence?
_____

VG_12m
During the last 12 months, how often have you played video games? This could include games on your smartphone, tablet, PC, or console.

- Never in the last 12 months (1)
- Less than once a month (2)
- About once a month (3)
- 2-3 times a month (4)
- About once a week (5)
- 2-3 times a week (6)
- 4 times or more a week (7)

TG_life

Have you done any of the following **for money at any time in your life**?

Note: If you are unsure of the answer to any, or don't know what the question refers to, please select "No"

	No (1)	Yes (2)
Bought lottery tickets (1)		
Bought instant scratch tickets (2)		
Played the pokies (3)		
Bet on a sporting event (4)		
Bet on novelty events, like who will win a reality TV show, or elections (5)		
Bet on a racing event (6)		
Played bingo (7)		
Played keno (8)		
Played casino table games (9)		
Bet on an esports event (a professional video game competition) (10)		
This is an attention check. Press "Yes" to continue. (13)		
Entered into a **paid** fantasy sports or daily fantasy sports competition (11)		
Gambled using skins or skin deposits for currency (12)		

SG_life

Have you done any of the following at any time in your life?

Note: If you are unsure of the answer to any, or don't know what the question refers to, please select "No"

	No (1)	Yes (2)
Played video games games with gambling components, like GTA's casino level (1)		
Played a video game which is also an esport (2)		
Watched an esports event (either online or in person) (3)		
Opened a loot box that you earned during a game (4)		
Bought a loot box with real money or via virtual currency that you purchased with real money (5)		
Entered into a **free** fantasy sports or daily fantasy sports competition (6)		
Played gambling-like games (e.g., simulated pokies, poker, roulette) **for free** via an app or on social networking sites (7)		
Paid to play gambling-like games (e.g., simulated pokies, poker, roulette) via an app or on social networking sites (e.g., paying to play through in-game purchases) (8)		
Played **free** demo or practice games on real gambling websites or apps, for example Mobile Casinos. (9)		

TG_12m_freq
During the last 12 months, about how often did you gamble **for money** on each of the following activities? Please note that this includes gambling in land-based venues and online.
Please note: Due to COVID restrictions, gambling has been disrupted since the start of the year. Please respond based on your normal gambling behaviour over a 12 month period.
(Please select one option for each gambling form)
(Only shown to people who took part in any forms in their lifetime, and each form only shown to people who reported taking part in that form.)

	Never in the last 12 months (0)	Less than once a month (1)	About once a month (2)	2-3 times a month (3)	About once a week (4)	2-3 times a week (5)	4 or more times a week (6)
Bought lottery tickets (gambling_12m_1)							
Bought instant scratch tickets (gambling_12m_2)							
Played the pokies (gambling_12m_3)							
Bet on a sporting event (gambling_12m_4)							
Bet on novelty events, like who will win a reality TV show, or elections (gambling_12m_5)							
Bet on a racing event (gambling_12m_6)							
Played bingo (gambling_12m_7)							
Played keno (gambling_12m_8)							
Played casino table games (gambling_12m_9)							
Bet on an esports event (a professional video game competition) (gambling_12m_10)							
Entered into a **paid** fantasy sports or daily fantasy sports competition (gambling_12m_11)							
Gambled using skins or skin deposits for currency (gambling_12m_12)							

TG_online
How much of your gambling is usually online? (0-100%)
_____

TG_spend
During the last 12 months, about how much money, not including winnings, did you spend on each activity **in a typical month**?

(Please enter whole numbers only)
Only shown form forms respondents indicated doing within the last 12 months

	Amount spent in whole dollars, per month
Buying lottery tickets (expenditure_12m_1)	
Buying instant scratch tickets (expenditure_12m_2)	
Playing the pokies (expenditure_12m_3)	
Betting on sporting events (expenditure_12m_4)	
Betting on novelty events, like who will win a reality TV show, or elections (expenditure_12m_5)	
Betting on racing events (expenditure_12m_6)	
Playing bingo (expenditure_12m_7)	
Playing keno (expenditure_12m_8)	
Playing casino table games (expenditure_12m_9)	
Betting on esports events (professional video game competitions) (expenditure_12m_10)	
Entering into **paid** fantasy sports or daily fantasy sports competitions (expenditure_12m_11)	
Gambling using skins or skin deposits for currency (expenditure_12m_12)	

Note to the reader: We asked the same questions for every form, but only display them for video games featuring gambling components here in the interests of space. The table below shows the wording for each form for respondents.

Form code	Wording in questions
Lot	bought a lottery ticket
Scratch	bought an instant scratch ticket, for money
Pokies	played the pokies
Sports	bet on sports
Novbet	bet on novelty events
Race	bet on racing events
Bingo	played bingo
Keno	played keno
Casino	played casino table games
Esportsbet	bet on esports
FS_paid	entered into a paid fantasy sports or daily fantasy sports competition
Skins	gambled using skins or skin deposits

Lot_lifecourse_intro
This next section asks about **buying lottery tickets**.

Lot_age_first
How old were you when you **first bought a lottery ticket**, for money?
(Please remember that this survey is anonymous.)

Your answer cannot be older than your current age, which is ${Age/ChoiceTextEntryValue}.
_____

Lot_age_recent
How old were you when you **most recently bought a lottery ticket**, for money?

Your answer must be between the age you first bought lottery tickets (${Lot_age_first/ChoiceTextEntryValue}), and your current age (${Age/ChoiceTextEntryValue}).
_____

Lot_age_most_freq
And how old were you when you were **most frequently buying lottery tickets**, for money?

Your answer must be between the age when you first did this activity (${Lot_age_first/ChoiceTextEntryValue}), and the age when you most recently did this activity (${Lot_age_recent/ChoiceTextEntryValue}).
_____

Lot_age_freq
Thinking about that time in your life, when you were ${Lot_age_most_freq/ChoiceTextEntryValue} and **most frequently buying lottery tickets**, how often did you take part?

- Less than once a month (1)
- About once a month (2)
- 2-3 times a month (3)
- About once a week (4)
- 2-3 times a week (5)
- 4 times or more a week (6)

TG_norms1
How many of your friends gamble? (If you don't talk about gambling with your friends, select "none of my friends gamble".)

Please note that gambling includes all of the forms we've just asked about, including instant scratch tickets, lotteries/lotto/pools, betting on sports, racing, esports or novelty events, bingo, keno, casino table games, fantasy sports and skin gambling.

- None of my friends gamble (1)
- Some of my friends gamble (2)
- Most of my friends gamble (3)
- All of my friends gamble (4)

TG_norms2
Thinking about when you were growing up, before you turned 18…

	Disagree (1)	(2)	(3)	(4)	(5)	(6)	Agree (7)
When I was growing up, my **friends** would have approved if I gambled. (1)							
When I was growing up, my **parents or guardians** would have approved if I gambled. (2)							
When I was growing up, my **other family members** would have approved if I gambled. (3)							
When I was growing up, most of my **friends** gambled. (4)							
When I was growing up, one or both of my **parents or guardians** gambled. (5)							
When I was growing up, most of my **other family members** gambled. (6)							
When I was growing up, when it came to gambling, I wanted to do what my **friends** thought I should do. (7)							
When I was growing up, when it came to gambling, I wanted to do what my **parents** thought I should do. (8)							
When I was growing up, when it came to gambling, I wanted to do what my **other family members** thought I should do. (9)							

TG_norms3

Thinking about when you were growing up, before you turned 18…

	Not at all (1)	(2)	(3)	(4)	(5)	(6)	Very much (7)
When you were growing up, when it came to gambling, how much did you want to be like your **friends**? (1)							
When you were growing up, when it came to gambling, how much did you want to be like your **parents**? (2)							
When you were growing up, when it came to gambling, how much did you want to be like your **other family members**? (3)							

GUS

Please use the scale below to indicate your level of agreement with the following statements.

	Strongly disagree (0)	(1)	(2)	(3)	(4)	(5)	Strongly agree (6)
All I want to do now is gamble (GUS_1)							
It would be difficult to turn down a gamble this minute (GUS_2)							
Having a gamble now would make things seem just perfect (GUS_3)							
I want to gamble so bad I can almost feel it (GUS_4)							
Nothing would be better than having a gamble right now (GUS_5)							
I crave a gamble right now (GUS_6)							

ErrorCogs_intro
Please answer each of the multiple choice questions below based on your general knowledge about gambling.

ErrorsCogs1
Which of the following set of lottery numbers has the greatest probability of being selected as the winning combination?

- 1, 2, 3, 4, 5, 6 (1)
- 8, 18, 3, 55, 32, 28 (2)
- each of the above have an equal probability of being selected (3)

ErrorsCogs2
Which gives you the best chance of winning the jackpot on a slot machine?

- Playing a slot machine that has not had a jackpot in over a month (1)
- Playing a slot machine that had a jackpot an hour ago (2)
- Your chances of winning the jackpot are the same on both machines (3)

ErrorsCogs3
How lucky are you? If 10 people's names (including yours) were put into a hat and one name drawn for a prize, how likely is it that your name would be chosen?

1. About the same likelihood as everyone else (1)
2. Less likely than other people (2)
3. More likely than other people (3)

ErrorsCogs4
If you were to buy a lottery ticket, which would be the best place to buy it from?

○ A place that has sold many previous winning tickets (1)

○ A place that has sold few previous winning tickets (2)

○ One place is as good as another (3)

ErrorsCogs5
A positive attitude or doing good deeds increases your likelihood of winning money when gambling.

- Disagree (1)
- Agree (2)

ErrorsCogs6
A gambler goes to the casino and wins 75% of the time. How many times has he or she likely gone to the casino?

- 4 times (1)
- 100 times (2)
- It is just as likely that he has gone either 4 or 100 times (3)

ErrorsCogs7
You go to a casino with $100 hoping to double your money. Which strategy gives you the best chance of doing this?

- Betting all your money on a single bet (1)
- Betting small amounts of money on several different bets (2)
- Either strategy gives you an equal chance of doubling your money (3)

ErrorsCogs8
Which game can you consistently win money at if you use the right strategy?

- Slot machines (1)
- Roulette (2)
- Bingo (3)
- None of the above (4) (exclusive answer)

ErrorsCogs9
Your chances of winning a lottery are better if you are able to choose your own numbers.

- Disagree (1)
- Agree (2)

ErrorsCogs10
You have flipped a coin and correctly guessed 'heads' 5 times in a row. What are the odds that heads will come up on the next flip. Would you say…

- 50% (1)
- more than 50% (2)
- or less than 50% (3)

GOES

Please indicate how strongly you agree or disagree with each statement.

	Strongly disagree (1)	(2)	(3)	(4)	(5)	Strongly agree (6)
Gambling is a rush (GOES_1Excite)						
Gambling is about enjoying intensive feelings (GOES_2Excite)						
Gambling gives a feeling of being really alive (GOES_3Excite)						
Gambling is a way to forget everyday problems (GOES_4Escape)						
Gambling is the best way to relax (GOES_5Escape)						
Gambling can help clear your mind (GOES_6Escape)						
Gambling helps release tension (GOES_7Escape)						
Gambling is about feeling like an expert (GOES_8Ego)						
Gambling produces a feeling of importance (GOES_9Ego)						
Gambling is about feeling in control (GOES_10Ego)						
Gambling produces a feeling of being powerful (GOES_11Ego)						
Gambling is a way to win big money immediately (GOES_12Money)						
Gambling provides a good chance to win big with small money (GOES_13Money)						
Gambling is a way to make big money (GOES_14Money)						
Gambling provides an opportunity to be with similar people (GOES_15Social)						
Gambling is a way to meet new people (GOES_16Social)						
Gambling provides an opportunity to get along with others favourably (GOES_17Social)						
Gambling provides an opportunity to be with friends (GOES_18Social)						

PGSI

Please answer the following questions about your gambling over the last 12 months (remember, this survey is anonymous, so please be as honest as you can).

In the last 12 months, how often:

	Never (0)	Sometimes (1)	Most of the time (2)	Almost always (3)
Have you needed to gamble with larger amounts of money to get the same feeling of excitement?				
Have people criticised your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true?				
Have you felt that you might have a problem with gambling?				
When you gambled, did you go back another day to try to win back the money you lost?				
Has gambling caused you any health problems, including stress or anxiety?				
Have you felt guilty about the way you gamble or what happens when you gamble?				
Has your gambling caused any financial problems for you or your household?				
Have you bet more than you could really afford to lose?				
Have you borrowed money or sold anything to get money to gamble?				

Help **If gambling is currently an issue for you, please call the Gambling Help line on 1800 858 858 or go to gamblinghelponline.org.au . Help is available 24/7 and is 100% confidential. If some of these questions have raised issues for you, please call 13 11 14 for help.**

SGHS

Considering the last 12 months, did you experience any of the following **as a result of your gambling**?

	No	Yes
Reduction of my available spending money (SGHS_1)		
Reduction of my savings (SGHS_2)		
Less spending on recreational expenses such as eating out, going to movies or other entertainment (SGHS_3)		
Had regrets that made me feel sorry about my gambling (SGHS_4)		
Felt ashamed of my gambling (SGHS_5)		
Sold personal items (SGHS_6)		
Increased credit card debt (SGHS_7)		
Spent less time with people I care about (SGHS_8)		
Felt distressed about my gambling (SGHS_9)		
Felt like a failure (SGHS_10)		

Help **If gambling is currently an issue for you, please call the Gambling Help line on 1800 858 858 or go to gamblinghelponline.org.au . Help is available 24/7 and is 100% confidential. If some of these questions have raised issues for you, please call 13 11 14 for help.**

NODS CLiP

Thinking about your life…

	No (0)	Yes (1)
Have there ever been periods lasting 2 weeks or longer when you spent a lot of time thinking about gambling experiences, or planning out future gambling ventures or bets? (NODS_CLiP_1)		
Have you ever tried to stop, cut down, or control your gambling (regardless of your success)? (NODS_CLiP_2)		
Have you ever lied to family members, friends, or others about how much you gambled or how much money you lost on gambling? (NODS_CLiP_2)		

SG_12m_freq
During the last 12 months, about how often did you take part in each of the following activities?

(Please select one option for each gambling form)
(Only shown to people who engaged in any forms, and each form only shown to people who engaged in that form.)

	Never in the last 12 months (0)	Less than once a month (1)	About once a month (2)	2-3 times a month (3)	About once a week (4)	2-3 times a week (5)	4 or more times a week (6)
Played video games with gambling components, like GTA's casino level (simulated_12m_1)							
Played a video game which is also an esport (simulated_12m_2)							
Watched an esports event (either online or in person) (simulated_12m_3)							
Opened a loot box that you earned during a game (simulated_12m_4)							
Bought a loot box with real money or via virtual currency that you purchased with real money (simulated_12m_5)							
Entered into a **free** fantasy sports or daily fantasy sports competition (simulated_12m_6)							
Played gambling-like games (e.g., simulated pokies, poker, roulette) **for free** via an app or on social networking sites (simulated_12m_7)							
Paid to play gambling-like games (e.g., simulated pokies, poker, roulette) via an app or on social networking sites (e.g., buying an app from an app store, or paying to play through in-game purchases) (simulated_12m_8)							
Played **free** demo or practice games on real gambling websites or apps, for example Mobile Casinos (simulated_12m_9)							

SG_spend
During the last 12 months, about how much money in total, did you spend on each activity **in a typical month**?
(Please enter whole numbers only)
(Only asked for forms in which they took part in the last 12 months.)

	Amount spent in whole dollars, per month
Bought a loot box with real money or via virtual currency that you purchased with real money (expenditure_12m_loot_box)	
Paid to play gambling-like games (e.g., simulated pokies, poker, roulette) via an app or on social networking sites (e.g., paying to play through in-game purchases) (expenditure_12m_SCG)	

Note to the reader: We asked the same questions for every form, but only display them for video games featuring gambling components here in the interests of space. The table below shows the wording for each form for respondents.

Form code	Wording in questions
VGGC	played video games with gambling components (like GTA's casino level).
VGesport	played a video game which is also an esport?
WatchEsports	watched esports
LBF	opened a loot box that you earned during a game
LBP	bought a loot box
FS_free	entered into a FREE fantasy sports or daily fantasy sports competition
SCG_free	played gambling-like games for FREE via an app or on social networking sites?
SCG_paid	PAYING to play gambling-like games via an app or on social networking sites
Demo	**Played free demo or practice games on real gambling websites or apps**?

VGGC_intro
This next section asks about **playing video games with gambling components (like GTA's casino level).**

VGGC_age_first
How old were you when you **first played video games with gambling components**?
(Please remember that this survey is anonymous).

Your answer cannot be older than your current age, which is ${Age/ChoiceTextEntryValue}.

VGGC_age_recent
How old were you when you **most recently played video games with gambling components**?

Your answer must be between the age you first played video games with gambling components (${VGGC_age_first/ChoiceTextEntryValue}), and your current age (${Age/ChoiceTextEntryValue}).

VGGC_most_freq
How old were you when you were **most frequently playing video games with gambling components**?

Your answer must be between the age when you first did this activity (${VGGC_age_first/ChoiceTextEntryValue}), and the age when you most recently did this activity (${VGGC_age_recent/ChoiceTextEntryValue}).

VGGC_freq
Thinking about that time in your life, when you were ${VGGC_most_freq/ChoiceTextEntryValue} and **most frequently playing video games with gambling components**, how often did you take part?

- Less than once a month (1)
- About once a month (2)
- 2-3 times a month (3)
- About once a week (4)
- 2-3 times a week (5)
- 4 times or more a week (6)

SG_intro
For these next few questions, we would like you to think about games with gambling-like elements, or simulated gambling products.
These include:

- **playing games with gambling components** in them (e.g., GTA with its casino level),
- **buying a loot box** with real money or via virtual currency that you purchased with real money,
- playing **gambling-like games** (e.g., simulated pokies, poker roulette) for free or for money via an app or on social networking sites, or
- playing **free demo or practice games** on real gambling websites or apps.

For the purposes of these questions below, we will use the term “simulated gambling”.

VGGC Playing video games with gambling content in them (like GTA's casino level)

LB_paid Buying loot boxes, either with real money or via virtual currency that you purchased with real money

SCG_free Playing gambling-like games (e.g., simulated pokies, poker, roulette) for free via an app or on social networking sites

SCG_paid Paying to play gambling-like games (e.g., simulated pokies, poker, roulette) via an app or on social networking sites(eg buying a simulated gambling app from an app store, or paying to play via in-game purchases)

Demo Playing **f**ree demo or practice games on real gambling websites or apps.

SG_friends
How many of your friends take part in simulated gambling?

- None of my friends (1)
- Some of my friends (2)
- Most of my friends (3)
- All of my friends (4)

SG_norms_intro
For these next few questions, we would like you to think about games with gambling-like elements, or simulated gambling products. These include: playing games with gambling components in them (e.g., GTA with its casino level), bought a loot box with real money or via virtual currency that you purchased with real money, played gambling-like games (e.g., simulated pokies, poker roulette) for free or for money via an app or on social networking sites, or free demo or practice games on real gambling websites or apps, for example Mobile Casinos.

SG_norms1
Thinking about when you were growing up, before you turned 18…

	Disagree (1)	(2)	(3)	(4)	(5)	(6)	Agree (7)
When I was growing up, my **friends** would have approved if I played simulated gambling games. (1)							
When I was growing up, my **parents or guardians** would have approved if I played simulated gambling games. (2)							
When I was growing up, my **other family members** would have approved if I played simulated gambling games. (3)							
When I was growing up, most of my **friends** played simulated gambling games. (4)							
When I was growing up, one or both of my **parents or guardians** played simulated gambling games. (5)							
When I was growing up, my **other family members** played simulated gambling games. (6)							
When I was growing up, when it came to playing simulated gambling games, I wanted to do what my **friends** thought I should do. (7)							
When I was growing up, when it came to playing simulated gambling games, I wanted to do what my **parents or guardians** thought I should do. (8)							
When I was growing up, when it came to playing simulated gambling games, I wanted to do what my **other family members** thought I should do. (9)							

SG_norms2
Thinking about when you were growing up, before you turned 18…

	Not at all (1)	(2)	(3)	(4)	(5)	(6)	Very much (7)
When I was growing up, when it came to playing simulated gambling games, how much did you want to be like your **friends**? (1)							
When I was growing up, when it came to playing simulated gambling games, how much did you want to be like your **parents or guardians**? (2)							
When I was growing up, when it came to playing simulated gambling games, how much did you want to be like your **other family members**? (3)							

Gaming_parent_super
How much do you agree or disagree with the following statement?

When I was growing up, my parents or guardians restricted or banned me from playing certain video games they considered undesirable.

- Strongly disagree (1)
- Disagree (2)
- Neither agree nor disagree (3)
- Agree (4)
- Strongly agree (5)

Gaming_motivations

How often do you participate in gaming because of the following reasons?
Please note - this includes any type of video gaming, not necessarily simulated gambling.

	Almost never/ never (1)	Sometimes (2)	Often (3)	Almost always (4)
Because you like the feeling (1)				
Because it's exciting (2)				
Because it's fun (3)				
Because it's what most of your friends do when they get together (4)				
To be sociable (5)				
Because it makes a social gathering more enjoyable (6)				
To forget your worries (7)				
Because it helps you when you are feeling nervous or depressed (8)				
To cheer up when you're in a bad mood (9)				
Because you are bored (10)				
As a way to celebrate (11)				
Because you feel more self-confident or sure of yourself (12)				
To get a high feeling (13)				
Because it is something you do on special occasions (14)				

Gaming harm

Please consider the following questions in relation to your **gaming**.

Please note - this includes any type of video gaming, not necessarily simulated gambling.

	No (1)	Yes (2)
Do you spend a lot of time thinking about games even when you are not playing, or planning when you can play next? (IGD_1)		
Do you feel restless, irritable, moody, angry, anxious or sad when attempting to cut down or stop gaming, or when unable to play? (IGD_2)		
Do you feel the need to play for increasing amounts of time, play more exciting games, or use more powerful equipment to get the same amount of excitement you used to get? (IGD_3)		
Do you feel you should play less, but are unable to cut back on the amount of time you spend playing games? (IGD_4)		
Do you lose interest in or reduce participation in other recreational activities (hobbies, meetings with friends) due to gaming? (IGD_5)		
Do you lie to family, friends or others about how much you game, or try to keep your family or friends from knowing how much you game? (IGD_6)		
Do you continue to play games even though you are aware of negative consequences, such as not getting enough sleep, being late to school/work, spending too much money, having arguments with others, or neglecting important duties? (IGD_7)		
Do you game to escape from or forget about personal problems, or to relieve uncomfortable feelings such as guilt, anxiety, helplessness or depression? (IGD_8)		
Do you risk or lose significant relationships, or job, educational or career opportunities because of gaming? (IGD_9)		

PARS

Please read each statement and select a number from 0 to 5 that indicates how true the statements typically were of your relationship with your parent or guardian **when you were growing up, before you turned 18**.

There are no right or wrong answers. Do not spend too much time on any statement.

	Not at all true (0)	A little of the time (1)	Some of the time (2)	A lot of the time (3)	Most of the time (4)	Nearly always or always true (5)
We ate meals together (1)						
We spent time together doing activities we each liked (2)						
We went to family events together (3)						
My parent or guardian encouraged me to get support from them or others (4)						
My parent or guardian showed affection to me (e.g., hugs, kisses, smiling, arm around shoulder) (5)						
My parent or guardian comforted me when I was upset (6)						
My parent or guardian made negative comments about me to others (7)						
During stressful times in my life, my parent or guardian checked if I was okay (8)						
My parent or guardian got upset when I disagreed with them (9)						
My parent or guardian played sport or did other physical activities with me (10)						
I complained about my parent or guardian (11)						
My parent or guardian encouraged me to do things I was interested in/enjoy (12)						
My parent or guardian thought I needed to change my attitude (13)						
My parent or guardian encouraged me to talk about my thoughts and feelings (14)						
My parent or guardian criticised me (15)						

BIS

Read each statement and mark the appropriate number on the right side of each item. Do not spend too much time on any statement. Answer quickly and honestly. Please think about how these statements apply to you **now**, rather than when you were growing up.

	Rarely/ never (1)	Occasionally (2)	Often (3)	Almost always/ always (4)
I plan tasks carefully (1)				
I do things without thinking (2)				
I don't "pay attention" (3)				
I am self-controlled (4)				
I concentrate easily (5)				
I am a careful thinker (6)				
I say things without thinking (7)				
I act on the spur of the moment (8)				

Satisfaction

How satisfied are you with your life as a whole now?

▼ 0 - No satisfaction at all (1) ... 10 - Completely satisfied (11)

PSSQ-Brief

For each of the statements below, please indicate your level of agreement.

Please consider these statements in relation to your life now, rather than when you were growing up.

	Not true at all (1)	Not true (2)	Somewhat true (3)	True (4)	Very true (5)
I experience a lot of understanding and security from others. (1)					
I know a very close person whose help I can always count on. (2)					
If necessary, I can easily borrow something I might need from neighbours or friends. (3)					
I know several people with whom I like to do things. (4)					
When I am sick, I can without hesitation ask friends and family to take care of important matters for me. (5)					
If I am down, I know to whom I can go without hesitation. (6)					

K6

During the **past 30 days**, about how often did you feel...

	None of the time (1)	A little of the time (2)	Some of the time (3)	Most of the time (4)	All of the time (5)
Nervous (1)					
Hopeless (2)					
Restless or fidgety (3)					
So depressed that nothing could cheer you up (4)					
That everything was an effort (5)					
Worthless (6)					

AUDIT-C_1

Please let us know about your alcohol intake by responding to the questions below. How often do you have a drink containing alcohol?

- Never (1)
- Monthly or less (2)
- 2-4 times a month (3)
- 2-3 times a week (4)
- 4 or more times a week (5)

AUDIT-C_2

How many standard drinks containing alcohol do you have on a typical day?

- 1 or 2 (1)
- 3 or 4 (2)
- 5 or 6 (3)
- 7 to 9 (4)
- 10 or more (5)

AUDIT-C_3

How often do you have six or more drinks on one occasion?

- Never (1)
- Less than monthly (2)
- Monthly (3)
- Weekly (4)
- Daily or almost daily (5)

DEMOGRAPHICS

Marital_status

What is your marital status?
(Please select one response)

- Single/never married (1)
- Living with partner/de facto (2)
- Married (3)
- Divorced or separated (4)
- Widowed (5)

Education

What is the highest level of education that you have completed?
(Please select one response)

1. Did not complete year 12 or equivalent (1)
2. Completed year 12 or equivalent (2)
3. Completed trade or technical certificate or diploma (3)
4. Completed an undergraduate qualification (4)
5. Completed a postgraduate qualification (5)

Work_status

What is your current work status?

- Employed full-time (1)
- Employed part-time or casual (2)
- Self-employed (3)
- Unemployed and looking for work (4)
- Full-time student (5)
- Full-time home duties (6)
- Retired (7)
- Sick or disability pension (8)
- Other (please specify) (9) _____

Country_birth

What is your country of birth?

- Australia (1)
- Country other than Australia (2)

Indig_status

For statistical purposes, are you of Aboriginal or Torres Strait Island origin?

- No, neither Aboriginal nor Torres Strait Islander (1)
- Yes, Aboriginal (2)
- Yes, Torres Strait islander (3)
- Yes, both Aboriginal and Torres Strait islander (4)

HH_comp

Which of these best describes your household?(Please select one response)

- You live alone (1)
- Single person living with children (2)
- Living with your partner and children (3)
- Living with your partner and not with children (4)
- Living with your parent(s) (5)
- Living in a group household (6)
- Other (please specify) (7) _____

Income_personal
What do you estimate your personal weekly (or annual) income before taxes was last year? (Please remember that this survey is anonymous. Please select one response)

- Negative income (1)
- Nil income (2)
- $1 - $199 ($1 - $10,399) (3)
- $200 - $299 ($10,400 - $15,599) (4)
- $300 - $399 ($15,600 - $20,799) (5)
- $400 - $599 ($20,800 - $31,199) (6)
- $600 - $799 ($31,200 - $41,599) (7)
- $800 - $999 ($41,600 - $51,999) (8)
- $1,000 - $1,249 ($52,000 - $64,999) (9)
- $1,250 - $1,499 ($65,000 - $77,999) (10)
- $1,500 - $1,999 ($78,000 - $103,999) (11)
- $2,000 or more ($104,000 or more) (12)

End
Thank you very much for taking part in our survey.

If gambling is currently an issue for you, please call the Gambling Help line on 1800 858 858 or go to gamblinghelponline.org.au . Help is available 24/7 and is 100% confidential. If some of these questions have raised issues for you, please call Lifeline on 13 11 14 for help.
Our findings will be publicised on our research group's Facebook page - https://www.facebook.com/cquegrl/

Thank you once again for taking part in our research. Your participation is very valuable to us.

Confidence intervals for multivariate analyses

Table 19 – Confidence intervals for distal risk factors predicting traditional gambling outcomes

	TG (any form, lifetime)	TG (any form, last 12 mths)	TG (number of forms, last 12 mths)	TG problems (last 12 months; PGSI)	TG problems (lifetime, NODS-CLiP)	TG (any form, lifetime)	TG (any form, last 12 mths)	TG (number of forms, last 12 mths)	TG problems (last 12 mths; PGSI)	TG (lifetime, NODS-CLiP)
	Bivariate					Multivariate				
SG - norms (parents, injunctive)	(0.371, 0.927)	(0.495, 0.798)	(0.348, 0.461)	(0.378, 0.552)	(0.426, 0.712)	(-0.244, 0.367)	(0.123, 0.488)	(0.124, 0.259)	(0.167, 0.382)	(0.177, 0.535)
SG - parental rule setting	(-0.048, 0.306)	(-0.087, 0.159)	(0.011, 0.134)	(-0.052, 0.144)	(-0.023, 0.226)			(-0.030, 0.078)		
Parents - involvement	(-0.152, 0.204)	(-0.082, 0.165)	(-0.030, 0.093)	(-0.146, 0.050)	(-0.162, 0.086)					
Parents - hostility	(-0.046, 0.316)	(0.152, 0.404)	(0.133, 0.254)	(0.193, 0.381)	(0.193, 0.448)		(-0.032, 0.269)	(0.002, 0.117)	(-0.019, 0.159)	(-0.033, 0.262)
Age	(0.216, 0.581)	(0.050, 0.298)	(0.061, 0.183)	(0.027, 0.222)	(-0.082, 0.166)	(-0.083, 0.395)	(-0.174, 0.142)	(-0.038, 0.090)	(-0.082, 0.103)	
Gender (ref = female)	(-0.375, 0.351)	(0.447, 0.955)	(0.193, 0.440)	(0.217, 0.606)	(0.388, 0.896)		(0.424, 1.000)	(0.111, 0.329)	(0.113, 0.433)	(0.361, 0.920)
Single (ref = no)	(-1.433, -0.538)	(-0.720, -0.202)	(-0.419, -0.164)	(-0.396, 0.006)	(-0.537, -0.020)	(-0.762, 0.287)	(-0.344, 0.313)	(-0.176, 0.073)		(-0.212, 0.420)
Education	(0.061, 0.430)	(-0.033, 0.213)	(0.036, 0.158)	(0.041, 0.235)	(-0.055, 0.192)	(-0.280, 0.211)		(-0.052, 0.071)	(-0.022, 0.166)	
Working (ref = no)	(0.832, 1.572)	(0.617, 1.143)	(0.242, 0.492)	(0.136, 0.552)	(0.239, 0.758)	(0.393, 1.287)	(0.342, 0.999)	(0.048, 0.298)	(-0.036, 0.348)	(0.092, 0.740)
Born overseas (ref = no)	(-0.851, -0.041)	(-0.744, -0.128)	(-0.291, 0.011)	(-0.429, 0.080)	(-0.129, 0.477)	(-0.651, 0.296)	(-0.693, 0.029)			
ATSI status (ref = no)	(0.475, 4.439)	(0.335, 1.368)	(0.426, 0.908)	(0.428, 1.106)	(0.357, 1.372)	(0.120, 4.142)	(0.041, 1.209)	(0.202, 0.628)	(0.270, 0.832)	(0.085, 1.200)
Live with parents (ref = no)	(-1.479, -0.743)	(-0.921, -0.404)	(-0.490, -0.241)	(-0.672, -0.266)	(-0.949, -0.425)	(-1.073, -0.140)	(-0.698, -0.036)	(-0.239, 0.010)	(-0.400, -0.033)	(-0.832, -0.211)
Income - personal	(0.403, 0.799)	(0.317, 0.574)	(0.161, 0.281)	(0.115, 0.307)	(0.100, 0.351)	(-0.121, 0.375)	(-0.036, 0.308)	(-0.015, 0.118)	(-0.098, 0.097)	(-0.178, 0.147)
Wellbeing	(-0.120, 0.233)	(-0.082, 0.164)	(0.002, 0.125)	(-0.109, 0.087)	(-0.146, 0.101)			(-0.014, 0.101)		
Impulsivity	(0.126, 0.488)	(0.118, 0.369)	(0.116, 0.237)	(0.225, 0.412)	(0.204, 0.462)	(-0.001, 0.406)	(-0.106, 0.189)	(0.020, 0.137)	(0.094, 0.264)	(-0.014, 0.276)
Perceived social support	(-0.201, 0.157)	(-0.182, 0.064)	(-0.071, 0.052)	(-0.168, 0.028)	(-0.185, 0.062)					

Psychological distress (ref = no)	(-0.361, 0.391)	(0.281, 0.802)	(0.213, 0.468)	(0.505, 0.888)	(0.498, 1.023)		(0.006, 0.654)	(-0.025, 0.227)	(0.113, 0.498)	(0.202, 0.827)
Alcohol use	(0.542, 1.030)	(0.418, 0.689)	(0.248, 0.365)	(0.184, 0.372)	(0.289, 0.548)	(0.250, 0.774)	(0.146, 0.454)	(0.071, 0.185)	(-0.042, 0.131)	(0.036, 0.332)
TG - first engaged while underage			(-0.115, 0.166)	(-0.264, 0.209)	(0.074, 0.639)			(-0.139, 0.103)		(0.093, 0.710)
TG - norms (parents, injunctive)	(0.758, 1.469)	(0.446, 0.736)	(0.309, 0.424)	(0.255, 0.439)	(0.258, 0.520)	(0.571, 1.378)	(0.152, 0.508)	(0.094, 0.224)	(-0.058, 0.151)	(-0.088, 0.256)
Constant						(1.811, 2.910)	(-1.102, -0.336)	(-0.327, -0.029)	(-0.509, -0.112)	(-1.349, -0.578)
Observations	1018					1018	1018	1018	401	1018
Log Likelihood						-325.59	-592.328	-1270.09	-470.631	-613.669
Akaike Inf. Crit.						677.179	1214.657	2576.18	969.263	1255.338

Note: All continuous variables scaled prior to analysis. The null value for all coefficients is 0. * $p < .05$, ** $p < .01$, *** $p < .001$. Note, coefficients only reported here in the interests of space. SG = simulated gambling, TG = traditional gambling, ATSI = Aboriginal or Torres Strait Islander.

Table 20 – Confidence intervals for proximal predictors of traditional gambling outcomes

Predictors	TG (any form, lifetime)	TG (any form, last 12 mths)	TG (number of forms, last 12 mths)	TG problems (last 12 months; PGSI)	TG problems (lifetime, NODS-CLiP)	TG (any form, lifetime)	TG (any form, last 12 mths)	TG (number of forms, last 12 mths)	TG problems (last 12 mths; PGSI)	TG (lifetime, NODS-CLiP)
	Bivariate					Multivariate				
Simulated gambling - at least monthly in the last 12 months	(0.928, 1.832)	(1.624, 2.180)	(0.859, 1.077)	(0.859, 1.200)	(1.384, 1.923)	(0.0001, 1.079)	(0.864, 1.555)	(0.230, 0.433)	(0.111, 0.390)	(0.358, 1.045)
Simulated gambling - amount of friends involved	(0.390, 0.817)	(0.481, 0.759)	(0.271, 0.387)	(0.296, 0.477)	(0.475, 0.753)	(-0.298, 0.233)	(-0.267, 0.110)	(-0.046, 0.054)	(-0.052, 0.083)	(-0.116, 0.244)
Gaming motivation - self gratification	(0.186, 0.585)	(0.563, 0.840)	(0.332, 0.445)	(0.524, 0.680)	(0.688, 0.976)	(-0.446, 0.020)	(-0.181, 0.196)	(-0.061, 0.043)	(0.070, 0.215)	(0.056, 0.415)
Gaming disorder (ref = no)	(0.115, 1.807)	(0.615, 1.520)	(0.729, 1.129)	(0.926, 1.437)	(1.308, 2.344)	(-1.097, 0.859)	(-0.990, 0.253)	(-0.045, 0.256)	(-0.047, 0.307)	(0.117, 1.350)
TG - number of forms, last 12 months				(0.502, 0.662)	(0.786, 1.144)				(-0.048, 0.111)	(-0.118, 0.354)
TG - expenditure last 12 months (log)			(0.557, 0.655)	(0.396, 0.568)	(0.490, 0.755)			(0.311, 0.406)	(0.041, 0.180)	(-0.074, 0.295)
TG - amount of friends involved	(0.821, 1.283)	(0.714, 1.027)	(0.309, 0.424)	(0.106, 0.298)	(0.461, 0.740)	(0.619, 1.160)	(0.505, 0.897)	(0.027, 0.125)	(-0.097, 0.027)	(0.115, 0.480)
Erroneous gambling cognitions	(0.447, 0.880)	(0.464, 0.732)	(0.329, 0.443)	(0.519, 0.676)	(0.664, 0.949)	(0.147, 0.660)	(-0.043, 0.323)	(0.007, 0.105)	(0.152, 0.286)	(0.235, 0.582)
Gambling urges	(1.262, 2.499)	(1.142, 1.537)	(0.579, 0.675)	(0.699, 0.826)	(0.931, 1.268)	(0.651, 1.846)	(0.715, 1.186)	(0.272, 0.389)	(0.344, 0.509)	(0.188, 0.633)
Constant						(2.095, 3.002)	(-0.704, -0.258)	(-0.211, -0.090)	(-0.260, -0.063)	(-0.800, -0.362)
Observations	1018	1018	1018	401	1018	1018	1018	1018	401	1,018
Log Likelihood						-322.182	-501.404	-1028.863	-332.053	-529.912
Akaike Inf. Crit.						660.365	1018.808	2075.726	684.106	1,079.82

Note: All continuous variables scaled prior to analysis. The null value for all coefficients is 0. * $p < .05$, ** $p < .01$, *** $p < .001$. Note, coefficients only reported here in the interests of space. SG = simulated gambling, TG = traditional gambling.

Table 21 – Confidence intervals for distal risk factors as predictors of proximal risk factors

Predictors	TG - number of forms, last 12 mths	TG - expenditure last 12 mths (log)	TG - amount of friends involved	Erroneous gambling cognitions	Gambling urges	SG - at least monthly in the last 12 months	SG - amount of friends involved	Gaming motivation - self gratification	Gaming disorder (ref = no)
	Linear	Linear	Linear	Linear	Linear	Logistic	Linear	Linear	Logistic
SG - norms (parents, injunctive)	(0.348, 0.461)	(0.200, 0.318)	(0.195, 0.314)	(0.246, 0.363)	(0.521, 0.622)	(0.529, 0.829)	(0.285, 0.401)	(0.364, 0.475)	(0.440, 0.772)
SG - parental rule setting	(0.011, 0.134)	(0.018, 0.141)	(0.081, 0.202)	(-0.056, 0.067)	(0.004, 0.127)	(-0.067, 0.182)	(0.049, 0.171)	(0.026, 0.148)	(0.101, 0.544)
Parents - involvement	(-0.030, 0.093)	(-0.028, 0.095)	(0.070, 0.192)	(-0.124, -0.001)	(-0.069, 0.054)	(-0.224, 0.025)	(0.007, 0.130)	(-0.005, 0.117)	(-0.210, 0.207)
Parents - hostility	(0.133, 0.254)	(0.091, 0.212)	(0.155, 0.275)	(0.087, 0.209)	(0.202, 0.321)	(0.202, 0.458)	(0.170, 0.290)	(0.190, 0.309)	(0.462, 0.892)
Age	(0.061, 0.183)	(0.055, 0.177)	(0.057, 0.179)	(-0.006, 0.117)	(0.016, 0.139)	(-0.032, 0.218)	(-0.050, 0.073)	(-0.025, 0.098)	(-0.145, 0.274)
Gender (ref = female)	(0.193, 0.440)	(0.028, 0.278)	(0.097, 0.346)	(-0.067, 0.183)	(0.226, 0.473)	(0.929, 1.452)	(0.110, 0.359)	(0.449, 0.689)	(0.191, 1.029)
Single (ref = no)	(-0.419, -0.164)	(-0.284, -0.028)	(-0.514, -0.261)	(-0.210, 0.047)	(-0.400, -0.144)	(-0.639, -0.120)	(-0.503, -0.250)	(-0.253, 0.004)	(-0.687, 0.163)
Education	(0.036, 0.158)	(-0.016, 0.107)	(0.006, 0.129)	(-0.001, 0.122)	(0.037, 0.159)	(-0.048, 0.201)	(-0.024, 0.099)	(0.019, 0.141)	(-0.310, 0.111)
Working (ref = no)	(0.242, 0.492)	(0.168, 0.419)	(0.252, 0.501)	(0.031, 0.284)	(0.159, 0.411)	(0.242, 0.765)	(0.091, 0.343)	(0.053, 0.306)	(0.049, 0.974)
Born overseas (ref = no)	(-0.291, 0.011)	(-0.285, 0.016)	(-0.224, 0.078)	(0.038, 0.340)	(-0.220, 0.082)	(-0.465, 0.152)	(-0.153, 0.150)	(0.071, 0.372)	(-0.330, 0.658)
ATSI status (ref = no)	(0.426, 0.908)	(0.219, 0.705)	(0.030, 0.518)	(0.393, 0.876)	(0.551, 1.030)	(0.426, 1.442)	(0.094, 0.582)	(0.058, 0.545)	(0.449, 1.679)
Live with parents (ref = no)	(-0.490, -0.241)	(-0.409, -0.159)	(-0.431, -0.181)	(-0.475, -0.226)	(-0.538, -0.290)	(-0.811, -0.288)	(-0.421, -0.170)	(-0.430, -0.179)	(-1.318, -0.333)
Income - personal	(0.161, 0.281)	(0.159, 0.279)	(0.149, 0.269)	(-0.010, 0.113)	(0.123, 0.243)	(0.143, 0.395)	(0.097, 0.218)	(0.021, 0.143)	(0.061, 0.483)
Wellbeing	(0.002, 0.125)	(-0.051, 0.072)	(0.027, 0.149)	(-0.082, 0.041)	(-0.054, 0.069)	(-0.131, 0.118)	(-0.030, 0.093)	(-0.035, 0.088)	(-0.290, 0.119)
Impulsivity	(0.116, 0.237)	(0.057, 0.179)	(0.046, 0.168)	(0.127, 0.248)	(0.227, 0.345)	(0.337, 0.605)	(0.121, 0.242)	(0.112, 0.234)	(0.461, 0.911)
Perceived social support	(-0.071, 0.052)	(-0.069, 0.054)	(0.032, 0.154)	(-0.197, -0.075)	(-0.121, 0.001)	(-0.330, -0.079)	(-0.040, 0.083)	(-0.032, 0.091)	(-0.222, 0.194)

Psychological distress (ref = no)	(0.213, 0.468)	(0.072, 0.330)	(0.183, 0.438)	(0.242, 0.496)	(0.371, 0.622)	(0.654, 1.184)	(0.364, 0.616)	(0.323, 0.575)	(0.839, 1.702)
Alcohol use	(0.248, 0.365)	(0.163, 0.283)	(0.285, 0.400)	(0.078, 0.200)	(0.271, 0.387)	(0.359, 0.622)	(0.244, 0.361)	(0.116, 0.237)	(0.436, 0.821)
TG - first engaged while underage	(-0.115, 0.166)	(-0.251, 0.030)	(-0.006, 0.275)	(-0.138, 0.144)	(-0.123, 0.158)	(-0.174, 0.394)	(0.036, 0.316)	(-0.142, 0.139)	(-0.359, 0.576)
TG - norms (parents, injunctive)	(0.309, 0.424)	(0.186, 0.305)	(0.234, 0.352)	(0.198, 0.317)	(0.452, 0.558)	(0.320, 0.587)	(0.188, 0.307)	(0.221, 0.339)	(0.388, 0.727)
Observations	1018	1018	1018	1018	1018	1018	1018	1018	1018

Note: All continuous variables scaled prior to analysis. The null value for all coefficients is 0. * $p < .05$, ** $p < .01$, *** $p < .001$. Note, coefficients only reported here in the interests of space. SG = simulated gambling, TG = traditional gambling, ATSI = Aboriginal or Torres Strait Islander.

Problem Gambling Severity Index and Short Gambling Harms Screen sample characteristics

The Problem Gambling Severity Index (PGSI) and Short Gambling Harms Screen (SGHS) were asked of the 402 respondents in the sample who reported gambling. This appendix describes the nature of these scales within this sample. Because this is a targeted sample from an online panel, the sample is not expected to be representative, and a higher proportion of higher-risk respondents is expected. For more, please see Russell et al. (2021).

Amongst the 402 respondents who completed the PGSI, the mean score was 7.04 (*SD* = 6.98), with a median of 5. Possible PGSI scores are 0 to 27. The PGSI was also split into categories based on the original cut-offs, in line with the scoring used in Australia. This breakdown is shown in Table 22 below.

For the SGHS, the mean score was 2.92 (*SD* = 2.97), with a median of 2 harms. Possible SGHS scores are 0 to 10.

Table 22 – Problem Gambling Severity Index categories (N = 402)

PGSI group	n	%
Non-problem	107	26.6
Low risk	54	13.4
Moderate risk	72	17.9
‘Problem’	169	42.0

Inside GAMBLING

Online magazine

See *Inside gambling* for the latest information, evidence and expert opinion on gambling issues in Australia and overseas.

Footy, friends and fun

On stigma and how we can tackle it

It's never too late to give up gambling

Hear from:

- public health experts
- gambling sector professionals
- people with firsthand experience of gambling harm.

Let us know what you'd like to read

If you have ideas for themes or stories for *Inside gambling*, we would love to hear from you.
Visit: **insidegambling.com.au/contact-us**

RESEARCH REPORT

From adolescence to young adulthood: Associations between simulated and traditional gambling, and the role of parental factors

February 2022

CONNECT WITH US ON:

vicrgf

responsiblegambling

Victorian Responsible Gambling Foundation

ResponsibleGambling

responsiblegambling.vic.gov.au

Victorian Responsible Gambling Foundation